

1. The Berman-Hartmanis conjecture states that for one certain class, all sets with this property are pairwise P-isomorphic. BPP has no known languages with this property. A tree of this type has all leaves on the last or second to last level, and all on the left. For a complexity class, if a problem is both that class hard and in that class, that problem can be described as having this property. In graph theory, a graph has this property if every pair of vertices is connected by an edge. For 10 points, give this word that when talking about decision problems such as knapsack and traveling salesman is added to the end of NP.

ANSWER: **complete** [accept **NP-complete** before BPP]

001-10-15-01102

2. One section of this work quotes the Irish folk song "Gilderoy" between interpretations of "McLeod's Reel." Its composer arranged all but one of its movements into a symphonic suite titled *Four Dance Episodes* from this work. This work quotes the railroad song "Sis Joe" in its first and fifth movements, and its main theme is taken from a folk song called "Bonaparte's Retreat." Its movements include "Saturday Night Waltz," "Corral Nocturne," and "Buckaroo Holiday." This ballet's plot is driven by rivalry over the Rancher's Daughter between the Champion Roper and the Wrangler, who ends up with the Cowgirl. For 10 points, name this ballet which features a "Hoe Down" and was written by Aaron Copland.

ANSWER: **Rodeo**

015-10-15-01103

3. One novel set in this nation sees Angel Face (an-HELL FAH-say) advise the title figure. Another novel set here depicts Gaspar Ilom's guerrilla war against agribusiness in this nation. Another author from this country was the subject of a book entitled "I," followed by her name, which detailed the war crimes against the Quiche (KEE-chay) peoples committed by its government. A novelist from this country depicted its natives struggling against commercial corn growers in *Men of Maize* and used its former leader Estrada Cabrera as inspiration for the novel *El Señor Presidente*. For 10 points, name this nation, the homeland of Miguel Asturias and Rigoberta Menchu.

ANSWER: Republic of **Guatemala**

026-10-15-01104

4. This author used the term "agonistic" to describe a competitive mechanism, which Derrida critiqued as providing only "time." This author's student Maurice Leenhardt coined the term "total social fact" in a reading of one of this man's works, which claims that the title object is imbued with "spiritual mechanisms" as a "total presentation." This author drew on Malinowski's description of the kula ring and the potlatch to argue that exchange creates an obligation to reciprocate, in a work on "the form and reason of exchange in archaic societies." For 10 points, name this French anthropologist, the nephew of Durkheim who wrote *The Gift*.

ANSWER: Marcel **Mauss**

026-10-15-01105

5. An 1829 ruling by this state's supreme court held that John Mann could not be prosecuted for shooting a slave because "The power of the master must be absolute, to render the submission of the slave perfect." During the Civil War, this state was governed by Zebulon Vance. In 1718, Alexander Spotswood invaded this state in order to capture the pirate Blackbeard. During the American Revolution, Lord Cornwallis won a pyrrhic victory over Nathanael Greene at this state's Battle of Guilford Courthouse. The Tuscarora War was fought in this state, whose fugitive slaves commonly hid out in its northeastern Great Dismal Swamp, which it shares with Virginia. For 10 points, name this state where the Wright brothers made their first successful flight at Kitty Hawk.

ANSWER: **North Carolina**

020-10-15-01106

6. Gibberellins are thought to induce germination by forcing the secretion of this enzyme by aleurone cells. The potency of a preparation of this enzyme may be measured in degrees Lintner. One form of this enzyme is inhibited by a compound isolated from white beans called phaseolamin. This enzyme's gamma form will act on alpha-1,6 bonds and favors acidic environments. Another form of this enzyme successively produces maltose units and functions in ripening; that form is the beta form. This enzyme breaks alpha-1,4-glycosidic bonds and is quickly inhibited by gastric acid. For 10 points, name this group of enzymes that break down starch into sugar, whose best known form is the "salivary" form.

ANSWER: **amylase**

022-10-15-01107

7. The book *P'ri Etz Hadar* popularized one of these events, which was established by the mystics of Safed in the sixteenth century. In that version of this event, participants drink white wine, then mixtures of white and red wine, and finally only red wine. In addition to the version of this event celebrated on Tu B'Shvat, participants in a different one of these events sing songs such as "Chad Gayda" and "Adir Hu." That version of this event ends with the phrase "Next year in Jerusalem," and features the hunt for the missing afikomen. Participants in this event place charoset and bitter herbs between matzah and recount the story of the exodus of the Jews from Egypt. For 10 points, name this celebratory meal held during Passover.

ANSWER: **seder**

004-10-15-01108

8. This poem's fourth section compares eyes to Dante's description of heaven as "the perpetual star / Multifoliate rose." This poem's third section laments that "Lips that would kiss / Form prayers to broken stone" and begins "This is the dead land." In the first section of this poem, the title group describe themselves as "Shape without form, shade without colour / Paralyzed force, gesture without motion," and call themselves "stuffed." The speaker of fifth and final section of this poem asserts "Between the idea / And the reality / falls the Shadow" and attempts to recite the Lord's Prayer, before concluding "This is the way the world ends / Not with a bang but a whimper." For 10 points, name this T. S. Eliot poem named for people who are spiritually empty.

ANSWER: "The **Hollow Men**"

002-10-15-01109

9. An armor-wearing knight almost falls out of a boat while kissing a nude Egyptian princess in this painter's *The Liberation of Arsinoe*. This artist painted portraits of Antonio Cappello, Nicolo Priull and other procurators of his city. After a 1577 fire devastated the Palazzo Ducale, he was commissioned to create the ceiling panel *Defence of Brescia*. At the center of another painting by this artist, a bearded, turbaned man holds up broken instruments of torture after a man lying on the ground is freed by St. Mark. In his painting of the Last Supper, a blazing lamp in the upper left lights up a dark room depicted on a diagonal. For 10 points, name this Renaissance artist from Venice who painted *The Miracle of the Slave* and whose nickname means "little dyer."

ANSWER: **Tintoretto** [or Jacopo **Robusti**]

063-10-15-01110

10. This dynasty won the throne in a succession crisis that started with the overthrow of Leonor Teles and ended, shortly before its founder signed the Treaty of Windsor with England, with a victory at the Battle of Aljubarrota. The Sixty Years' Captivity began upon the death of Henry I, the last ruler of this dynasty; Henry had succeeded to the throne when Sebastian disappeared, presumed dead, after being defeated at Alcazarquivir. The best-known member of this dynasty did not even rule the country, but sponsored expeditions that sailed around Cape Bojador and reached the mouth of the Gambia River. For 10 points, name this dynasty that ruled Portugal from 1384 to 1580, whose members included Henry the Navigator.

ANSWER: **Aviz** Dynasty

003-10-15-01111

11. The middle course of this river cuts through the Loess Plateau, and silt collection at this river's Sanmen Gorge dam has led to erosion in its delta. Ice jams on this river near Kaifeng are broken up by air bombardment, and rises in the Bayan Har Mountains on the Eastern Tibetan Plateau. This river flows through the cities of Xi'an, Lanzhou, and Jinan, and it is connected to the Wei River by the People's Victory Canal. This river's propensity to flood the North China Plain has earned it the nickname "China's Sorrow." For 10 points, name this second longest river in China that flows into its namesake sea.

ANSWER: **Yellow** River [or **Huang He**; or **Huang Ho**]

030-10-15-01112

12. A model of this phenomenon that plots relays by alpha and beta thresholds scaled by a factor mu is named for Preisach. The creation of a system of a certain type of wire exhibiting this phenomenon results in the Wiegand effect, and it can be measured by plotting magnetic field versus Kerr rotation. Motion in domain walls associated with this leads to the Barkhausen effect. The persistence of magnetization after an external magnetic field is removed is this effect's namesake "loop." For 10 points, name this phenomenon in which a material exhibits "memory" by lagging in response to changes.

ANSWER: **hysteresis**

032-10-15-01113

13. In this novel's fourth chapter, a poet nicknamed "Homeless" is arrested and taken to a hospital run by Dr. Stravinsky. The main female character of this novel destroys the apartment of the critic Lasunsky after rubbing cream on her body that makes her youthful but turns her into a witch. The antagonist of this novel moves into Apartment number fifty, and gives a ball on Walpurgis Night where Baron Maigel is murdered. That antagonist is accompanied by the demons Azazello, Behemoth, and Korovyev, and is known as Professor Woland. The first title character of this novel writes a novel about Pontius Pilate, and is eventually reunited with the title woman. For 10 points, name this novel in which Satan visits Moscow, the masterpiece of Mikhail Bulgakov.

ANSWER: *The **Master and Margarita***

064-10-15-01114

14. This battle begun with a nighttime offensive on a position named Beatrice during which the attackers used direct artillery fire because of their lack of experienced gunners. The next phase of this battle centered on Gabrielle and rendered the defenders' airstrip useless, after which many of the indigenous T'ai people abandoned Anne-Marie. Following several days of trench warfare, a final all-out assault was ordered by Vo Nguyen Giap, leading to the capture of over 10,000 prisoners. For 10 points, name this 1954 battle, the decisive engagement in the First Indochina War.

ANSWER: Battle of **Dien Bien Phu**

040-10-15-01115

15. In one work, this thinker analyzes the development of the *Trauerspiel* genre of drama. This author of *The Origin of German Tragic Drama* and *Theses on the Philosophy of History* spent years unsuccessfully trying to complete his analysis of certain structures in Paris that were key to the culture of the *flâneur* or “stroller.” This author of *The Arcades Project* wrote an essay describing how mass culture shattered the “aura” ritualistically associated with unique pieces of art. For 10 points, name this French philosopher from the Frankfurt School, the author of *The Work of Art in the Age of Mechanical Reproduction*.

ANSWER: Walter **Benjamin**

052-10-15-01116

16. This composer wrote an extended cantata whose first part climaxes on "Thou art unchanging," which is set to text taken from the journals of Kierkegaard. An opera by this composer features the aria "Must the Winter Come So Soon" and a scene at a New Year's Eve party where the title character becomes engaged to her former lover's son, both of whom are named Anatol. This composer arranged one of his B-flat minor works for eight-part choir as a setting of *Agnus dei*; that work is in four-two time and was originally the second movement of his first string quartet. For 10 points, name this composer of *Vanessa*, *Concerto for Piano and Orchestra*, and *Adagio for Strings*.

ANSWER: Samuel Osborne **Barber II**

022-10-15-01117

17. The solid red epsilon phase of this material has been shown to be a crystal of eight-atom molecules, and its singlet state has been observed in reactions with enzymes such as chloroperoxidase. Its singlet state can also mediate Diels-Alder and other *-ene* reactions, and this element undergoes a cycle with fluorine in certain massive stars. A lack of nickel or tectonic event are two theories for this element's namesake "catastrophe," or its precipitous increase in the atmosphere millions of years after the development of photosynthetic plants. For 10 points, this is what element of atomic weight 16, symbolized O?

ANSWER: **oxygen**

032-10-15-01118

18. Several field hands and servants in this novel live in Brunswicktown, a location contrasted with a mansion that includes the Deadening and Mound Field. In this novel, the field hands prepare Marmion under Uncle Battle's orders. An unappreciated cousin in this novel is saved in a railroad trestle by George, whose wife Robbie is forced to travel to Shellmound to attend the title event. This novel begins with nine year old Laura McRaven taking a train from Jackson to see her cousin participate in the title event. For 10 points, name this novel by Eudora Welty about the marriage of Troy Flavin and Dabney Fairchild.

ANSWER: **Delta Wedding**

020-10-15-01119

19. While serving as Secretary of Education, this politician ended the policy of providing free milk for elementary school children, which led critics to call this politician "milk snatcher." The second term of this prime minister featured the privatization of Girobank and the National Grid, and saw this politician survive an assassination attempt during the Brighton Hotel bombing. Michael Heseltine resigned from this leader's cabinet during the Westland Affair, though better known events from this leader's tenure were the earlier hunger strike led by Bobby Sands and the Falkland Islands War. For 10 points, name this prime minister of Great Britain nicknamed the "Iron Lady."

ANSWER: Margaret **Thatcher**

040-10-15-01120

20. The *Theogony* notes that this goddess is "a nurse of the young" and that, although she is an only child, Zeus honors this goddess "above all." Although this goddess was mainly worshipped at Lagina, she is believed to be of Carian origin and possibly originally a daughter of Cybele. According to the Homeric Hymn to Demeter, this daughter of Perses and Asteria also heard Persephone's cries. Female puppies were sacrificed to this goddess, who was sometimes equated with Artemis by the Greeks and moon goddesses by the Romans. Jason made an offering of black ewe's blood and honey to this goddess to obtain her help in applying "the Promethean charm" prepared by Medea, a disciple of this goddess. For 10 points, name this goddess of witchcraft, most associated with black magic.

ANSWER: **Hecate**

003-10-15-01121

21. The chief English ambassadors to this entity were Christopher Mont, Edward Foxe, and Nicholas Heath. William Paget and Robert Barnes talked with this group about a common opposition to the Hapsburgs, and considered paying one hundred thousand crowns in return for English membership in this entity. Led by Philip of Hesse and John Frederick of Saxony, it eventually lost at Mulberg to Spanish soldiers led by Charles V. Thomas Cromwell encouraged Henry VIII to support this entity, leading the king to marry Anne of Cleves. Founded at a namesake Thuringian town in 1530, for 10 points, name this group of German protestant states during the Reformation who formed an alliance modeled after the Swabian League.

ANSWER: **Schmalkaldic** League

063-10-15-01122

22. One class of these objects was discovered when an expected titanium dioxide absorption band was not found. These objects have fairly consistent radii because light ones are limited by Coulomb pressure, while heavier ones are limited by electron degeneracy pressure. Divided into classes like L, T, and Y, these objects can be identified via the presence of methane, and the majority of them exhibit a lithium line. These objects must be fully convective, with no difference in composition at different depths. For 10 points, name these objects too small to maintain continuous nuclear fusion.

ANSWER: **brown dwarfs**

022-10-15-01123

23. In one of this author's plays, Heracles kills the tyrant Lycus, only to kill his children upon being driven insane by Hera. This playwright wrote about a power struggle in Thebes following the departure of Oedipus in *The Suppliants*. The title character agrees to take Admetus' place in death in this author's play *Alcestis*. This author of the only remaining satyr play, *Cyclops*, wrote a play whose title character kills her rival with a poisoned dress, as well as a play in which Hecuba, Cassandra, and Andromache lament their fates before being taken captive to Greek ships. For 10 points, name this ancient Greek playwright of *Medea* and *The Trojan Women*.

ANSWER: **Euripedes**

015-10-15-01124

1. One side in this conflict was forced to wear a yellow cross, while another side was led in part by Simon de Montfort. For 10 points each:

[10] Name this military conflict meant to eliminate the Cathar heresy in Languedoc.

ANSWER: **Albigensian** Crusade

[10] The Albigensian Crusade came after this crusade that opened with the Siege of Zara and ended with the capture of Constantinople.

ANSWER: **Fourth** Crusade

[10] The Third Crusade in turn saw Christian forces defeated by this Muslim Sultan of the Ayyubid Caliphate in a failed attempt at capturing Jerusalem.

ANSWER: **Saladin** [accept **Salah al-Din** Yusuf Ibn Ayyub]

064-10-15-01201

2. These two individuals were given the task of surviving a night in the Dark House, a task given to them by One and Seven Hunahpu. For 10 points each:

[10] Give the common name for this pair of individuals who were individually known as Hunahpu and Xbalanque.

ANSWER: **Hero Twins**

[10] The Hero Twins are found in the Popul Vuh, a mythological text of this civilization.

ANSWER: **Mayan** civilization

[10] The father and uncle of the Hero Twins were killed playing a ball game in this Mayan underworld.

ANSWER: **Xibalba**

064-10-15-01202

3. This poem exalts a "shattered hulk" that was once the "eagle of the sea." For 10 points each:

[10] Name this poem that begins by exclaiming "Ay, tear her tattered ensign down!" Its first stanza ends by lamenting that the "meteor of the ocean air / Shall sweep the clouds no more."

ANSWER: "**Old Ironsides**"

[10] "Old Ironsides" is a poem by this American who first called Boston "the Hub" in his collection *The Autocrat of the Breakfast Table*.

ANSWER: Oliver Wendell **Holmes** Sr.

[10] Oliver Wendell Holmes Sr. also wrote this poem that urges "build thee more stately mansions, O my soul" It is addressed to a "ship of pearl."

ANSWER: "The **Chambered Nautilus**"

026-10-15-01203

4. It was the result of investigations into the crystallization of igneous rock from magma. For 10 points each:

[10] Name this diagram that has olivine on the tip of one branch and quartz at the bottom.

ANSWER: **Bowen's** reaction series

[10] Plagioclase feldspars make up this part of Bowen's reaction series which runs from anorthite to albite.

ANSWER: **continuous** branch

[10] The minerals on at the higher temperatures of the Bowen's reaction series are of this type that have relatively high amounts of magnesium and iron.

ANSWER: **mafic**

001-10-15-01204

5. This pyramidal mountain overlooks bodies of water like the Riffelsee lake in the town of Zermatt. For 10 points each:

[10] Name this mountain on the Swiss-Italian border, first scaled by Edward Whymper.

ANSWER: the **Matterhorn**

[10] The Matterhorn is part of this Swiss-Italian range, a subset of a larger mountain range. It is separate from the "Swiss" subset of that range.

ANSWER: the **Pennine Alps** [prompt on **Alps**]

[10] This highest mountain of the Alps is accessed from nearby towns like Chamonix, which hosted the first Winter Olympics.

ANSWER: **Mont Blanc**

032-10-15-01205

6. This room's frescoes include *The Cardinal Virtues*, *The Parnassus*, and *Disputation of the Holy Sacrament*. For 10 points each:

[10] Name this room of the Vatican palace which also features *The School of Athens*.

ANSWER: Stanza della **Segnatura** [or Room of the **Signatura**]

[10] The Stanza della Segnatura is one of the four rooms often named for this *School of Athens* artist.

ANSWER: **Raphael**

[10] One of Raphael's rare mythological paintings was his *Triumph of this figure*. She was painted "of the spheres" by Salvador Dali and is depicted leaning down and kissing her lover in a Jean-Leon Gerome painting.

ANSWER: **Galatea**

015-10-15-01206

7. It is thought to be the country on which Samuel Butler based Erewhon. For 10 points each:

[10] Name this country that was also the setting for Keri Hulme's Booker-winning novel *The Bone People*.

ANSWER: **New Zealand**

[10] Almost all literature coming out of New Zealand is written in English and not in this language, which is spoken by namesake aboriginal inhabitants.

ANSWER: **Maori**

[10] This New Zealand author fictionalized her childhood home on Timakori Road as the Sheridan family's house in "The Garden Party."

ANSWER: Katherine **Mansfield** [or Kathleen **Mansfield** Beauchamp]

003-10-15-01207

8. Answer the following questions about a certain acid, for 10 points each.

[10] This acid's pure form is known as "glacial," and it is the key ingredient of vinegar.

ANSWER: **acetic** acid [or **ethanoic** acid]

[10] The rate-determining step of this process is the addition of methyl iodide to the catalyst. It has been mostly replaced by the Cativa process for the production of acetic acid.

ANSWER: **Monsanto** process

[10] The iridium catalyst in the Cativa process can be promoted by this element with atomic number 44 which is also the basis for Grubbs' catalyst.

ANSWER: **ruthenium** [or **Ru**]

024-10-15-01208

9. It was sparked by anti-Japanese violence in California and segregation in San Francisco schools. For 10 points each:

[10] Name this informal pact by which Japan stopped immigration to America in exchange for the end of legal discrimination against Japanese immigrants.

ANSWER: **Gentlemen's Agreement**

[10] Fred Korematsu was among this generation of Japanese immigrants. This term usually refers to immigrants whose parents were born in Japan but who were themselves born in America.

ANSWER: **Nisei**

[10] Life at this large Japanese internment camp was documented in a series of photographs by Ansel Adams.

ANSWER: **Manzanar**

015-10-15-01209

10. This symphony's nickname derives from its second movement, where Turkish drums clamorously upset the opening melody. For 10 points each:

[10] Identify this G major symphony, the one hundredth of its composer, which was derided by conductor Thomas Beecham with the comment "the English do not like music, only the noise it makes."

ANSWER: the **Military** symphony

[10] The *Military* was one of the twelve London Symphonies by this composer, whose works, listed in the Hoboken catalog, also include the *Surprise* symphony and the oratorio *The Creation*.

ANSWER: Franz Joseph **Haydn**

[10] In this 103rd Haydn symphony, also part of the London group, the title flourish is heard at the beginning on the tympanis, and Croatian folk songs are incorporated into the second movement.

ANSWER: the **Drumroll** symphony

019-10-15-01210

11. In 1905, an event called Bloody Sunday paved the way for reforms in early twentieth century Russia. For 10 points each:

[10] This final czar of Russia was in power during the massacre. He abdicated the throne in 1917 during the second Russian Revolution.

ANSWER: **Nicholas II** [prompt on **Nicholas**]

[10] After Bloody Sunday, Nicholas issued this statement guaranteeing many civil liberties to the people of Russia; in practice, because Nicholas retained veto power over the Duma, it had little effect.

ANSWER: **October Manifesto**

[10] Much of the October Manifesto was written by this prime minister who had led the Russian delegation at the signing of the Treaty of Portsmouth.

ANSWER: Sergei **Witte**

040-10-15-01211

12. For its conditions to hold, there must be random mating and a large population size. For 10 points each:

[10] Name this equilibrium that states that one equals $p^2 + 2pq + q^2$, where p and q are the frequencies of two alleles in the gene pool.

ANSWER: **Hardy-Weinberg** Equilibrium

[10] The 2pq term in Hardy-Weinberg Equilibrium represents the proportion of these organisms within a population.

ANSWER: **heterozygotes** [accept word forms]

[10] Levels of heterozygosity in a population can be described by statistics with this letter as a name. They were developed by Sewall Wright.

ANSWER: **F** statistic

001-10-15-01212

13. This book contrasts the Knight of Infinite Resignation with the Knight of Faith, who gives up everything, but trusts that it will all be returned to him in time. For 10 points each:

[10] Name this book that examines the ethical ramifications of God's ordering Abraham to sacrifice Issac and claims faith is found by believing in the absurd.

ANSWER: **Fear and Trembling** [or **Frygt og Baeven**]

[10] This Danish philosopher explored the contrast between the ethical and aesthetic in *Either/Or* in addition to writing *Fear and Trembling*.

ANSWER: Soren **Kierkegaard**

[10] In this section of *Either/Or*, the Aesthete presents the story of Johannes, who manipulates Cordelia into leaving her fiancee Edvard and devoting herself to him.

ANSWER: "The **Seducer's Diary**" [or "**Diary of a Seducer**"]

002-10-15-01213

14. This man's neighbor is the Squire of the Woods, who is revealed to be Thomas Cecial. For 10 points each:

[10] Name this squire to Don Quixote.

ANSWER: **Sancho Panza** [accept either]

[10] Sancho Panza rides one of these animals named Dapple. A book by Juan Ramon Jimenez lovingly describes one of these animals named Platero.

ANSWER: **donkeys** [or **burros**]

[10] In the frame story of *Don Quixote*, Cervantes claims that the novel is a translation of the manuscripts of this Moorish author.

ANSWER: Cide Hamete **Benengeli**

064-10-15-01214

15. This book accuses Woodrow Wilson of being "slow and inadaptable." For 10 points each:

[10] Name this influential 1919 book in which its author blasted the Treaty of Versailles and correctly predicted economic disasters like inflation and stagnation would hit Europe in the years to follow.

ANSWER: **The Economic Consequences of the Peace**

[10] *The Economic Consequences of the Peace* was written by this influential British economist, who outlined his liberal views in such works as *Treatise on Money* and *General Theory on Employment, Interest, and Money*.

ANSWER: John Maynard **Keynes**

[10] Keynes represented Great Britain at this 1944 conference in New Hampshire in which various world powers proposed ways of restoring the international economy after World War II. The International Monetary Fund and the General Agreement on Tariffs and Trade were proposed here.

ANSWER: **Bretton Woods** [or **United Nations Monetary and Financial Conference**]

052-10-15-01215

16. This emperor was known as "Sandrokypotos" to the Greeks. For 10 points each:

[10] Name this unifier of India who conquered the satrapies of Alexander the Great's conquest and died around 300 BCE.

ANSWER: **Chandragupta** [accept **Chandragupta** Maurya]

[10] Chandragupta was the first ruler of this Indian dynasty, which overthrew the Nanda and included rulers like Ashoka and Bindusara.

ANSWER: **Mauryans** [accept **Mauryan** empire]

[10] Chandragupta's adviser, Chanakya, used the name Kautilya to write this treatise on diplomacy and military strategy whose name roughly translates as "Treatise on Polity."

ANSWER: the **Arthashastra**

026-10-15-01216

17. Name some effects that occur when electrons encounter radiation or other particles, for 10 points each.
[10] This type of scattering, which is named for an American physicist, occurs when X-rays or gamma rays scatter inelastically off of electrons.

ANSWER: **Compton** scattering

[10] This type of radiation occurs when high-speed relativistic electrons travel in a curved path because of the effect of a magnetic field. It is the relativistic analogue of cyclotron radiation.

ANSWER: **synchrotron** radiation

[10] This radiation with a continuous spectrum is produced when an electron accelerates when deflected by a charged particle.

ANSWER: **bremstrahlung** [accept **breaking** radiation; accept **free-free** radiation]

026-10-15-01217

18. This religion reveres twenty-four tirthankars, the last of whom is Mahavira. For 10 points each:

[10] Name this Indian religion.

ANSWER: **Jainism**

[10] This central principle of Jainism directs followers not to intentionally harm any living thing. It has a less central, though similar, meaning of non-violence in Hinduism and Buddhism.

ANSWER: **ahimsa**

[10] Both Hindus and Jains attempt to achieve this status, which is the escape from the cycle of birth and rebirth known as samsara.

ANSWER: **moksha** [do not accept "nirvana"]

003-10-15-01218

19. The title character of this novel is rescued by the bandit Donald Bean Lean after being held in Stirling Castle on charges of treason. For 10 points each:

[10] Name this character, a British soldier for George II who ultimately joins the cause of the Young Pretender. He is the namesake of a series of novels by the same author.

ANSWER: **Edward Waverly** [accept either name]

[10] Name the author of the *Waverly* novels who also wrote poems such as *The Lay of the Last Minstrel* and *The Lady of the Lake*.

ANSWER: Sir Walter **Scott**

[10] In this novel by Walter Scott, Effie Deans' infant child is stolen by the midwife Meg Murdockson. Effie is exonerated through the efforts of her sister Jeanie. Effie's child ultimately becomes an outlaw and murders his own father in this work.

ANSWER: *The **Heart of Midlothian***

030-10-15-01219

20. During the second act of this opera, the main characters watch a performance of *The Red Detachment of Women*. For 10 points each:

[10] Name this 1987 opera which begins with a plane landing onstage. Its composer adapted the foxtrot from its final act into a piece called "The Chairman Dances."

ANSWER: ***Nixon in China***

[10] This minimalist composer of *Nixon in China* also created a two-piano work titled *Hallelujah Junction* and an opera titled *The Death of Klinghoffer*.

ANSWER: John **Adams**

[10] This Adams piece, a "Fanfare for Orchestra," begins with woodblock quarter-notes soon joined by four trumpets. Its rhythm depicts the exhilaration of a sports car.

ANSWER: ***Short Ride in a Fast Machine***

022-10-15-01220

21. This theorem requires a function that is continuous on the closed region $[a,b]$, where $f(a)$ equals $f(b)$. For 10 points each:

[10] Name this theorem that states there is point c in this region where the derivative of f at c will equal zero.

ANSWER: **Rolle's** theorem

[10] Rolle's theorem is a special case of this other theorem which states that there is a point c in the closed region $[a,b]$ whose derivative is equal to the slope of the line connecting a and b .

ANSWER: **mean value** theorem

[10] The so called second mean value theorem only applies to functions that are entirely increasing or entirely decreasing on a certain closed interval, a property given this name.

ANSWER: **monotonicity**

064-10-15-01221