**2016 VHSL Conferences - Round 05 - First Period, Fifteen Tossups**

1. Many theorems in a field of analysis named for these numbers are due to Cauchy. The arg function in mathematics takes these numbers as an input. The mathematical function cis **("sis")** found in Euler's formula is one of these numbers. The fundamental theorem of algebra states that polynomials have at least one root that is this type of number. Taking the conjugate reverses the sign of one part of these numbers. For 10 points, name these numbers that have a real part and an imaginary part.
ANSWER: **complex** numbers [or **C**]

2. Roger Sperry rotated the eye of an animal in this class and discovered it attempted to capture prey by extending its tongue downward instead of upward. That model organism in this class was *Xenopus* **(ZEN-oh-pus)** *laevis* **(LAY-uh-vis)**. Animals in this class include the axolotl **(ax-uh-LAH-tull)**, which keeps its gills and reaches adulthood without metamorphosis. For 10 points, name this class that includes African clawed frogs.
ANSWER: **amphibia**ns

3. In a painting from this movement for which the French Academy invented a new genre category called the "fete galante," several couples prepare to board a golden boat to the mythical birthplace of Venus. In another painting from this movement, a man tries to gaze up the skirt of a woman riding a swing. Those paintings were created by the leading lights of this movement, Watteau and Fragonard. For 10 points, name this frilly style of art popular in 18th century France.
ANSWER: **Rococo**

4. Ovitraps are used to monitor populations of these organisms, particularly the chikungunya **(chik-un-GOON-yuh)**-spreading species in their *Aedes* **(ay-EE-deez)** genus. *Plasmodium falciparum* **(fal-SIH-puh-rum)** can infect species in the *Anopheles* **(a-NOFF-uh-leez)** genus of these organisms. These winged organisms can carry the causative agents of dengue **(DEN-gee)** fever and west Nile virus. A For 10 points, name these insect vectors of malaria.
ANSWER: **mosquito**es [or ***Aedes***, ***A****edes* ***aegypti***, or ***A****edes* ***albopictus*** before "*Aedes*" is read; or ***Anopheles*** *gambiae* or ***A****nopheles* ***gambiae*** before "*Anopheles*" is read; prompt on **flies**]

5. An operation by this man's forces was betrayed by James Wilkinson, who revealed this man wanted to claim part of Louisiana. The House of Representatives voted against this man after he tied for president in the election of 1800. Four years later, at Weehawken, New Jersey, he met his Federalist rival, who may have fatefully intentionally missed this man with the first shot. For 10 points, name this first Vice-President for Thomas Jefferson who killed Alexander Hamilton in a duel.
ANSWER: Aaron **Burr** [Aaron **Burr**, Jr.]

6. This character chastises his friend for not reading when he suggests sawing a man's leg off to help him escape. This character flirts with Amy Lawrence. This character manages to escape McDougal's Cave, although the killer of Dr. Robinson is trapped inside and starves. He tricks his friends to pay him to whitewash a fence. This youngster is in love with Becky Thatcher and is raised by his Aunt Polly. For 10 points, name this Mark Twain character, a youth who is the friend of Huckleberry Finn.
ANSWER: **Tom** Sawyer [or **Thomas**; or **Sawyer**]

7. A minority group believes that this title can only be held by a member of the Ahl al-Bayt, and it was once awarded by the "shura" process. The first four people to hold this title were known as "rightly guided" or "rashidun" **(RAH-shee-dun)**. Dispute over who should have first held this title was an early point of contention between Sunnis and Shias. This title was held first by Abu Bakr **(AH-boo-bek-er)** and fourth by Ali **(AH-lee)**. For 10 points, give this title held by the leaders of the Islamic world.
ANSWER: **caliph**

8. This city joined the new National Pro Fastpitch women's softball league in 2015 with the Charge. It is also home to the Wings, a WNBA team. A hockey team in this city defeated the Buffalo Sabres on Brett Hull's "crease goal" to win the 1999 Stanley Cup. This city is home to a football team that was quarterbacked by Roger Staubach and Troy Aikman to several Super Bowl wins, and is owned by Jerry Jones. For 10 points, name this home to the NHL's Stars and the NFL's Cowboys.
ANSWER: **Dallas**

9. Merrill Carlsmith co-designed an experiment testing this phenomenon, in which subjects paid less to slowly turn pegs demonstrated more enthusiasm for the task. This concept was explored in a book about the Dorothy Martin UFO cult, entitled *When Prophecy Fails*, and co-written by Leon Festinger. For 10 points, name this psychological phenomenon, in which people seek to minimize mental stress by resolving conflicts between reality and their expectations or values.
ANSWER: **cognitive dissonance**

10. A test of this principle measured the intensity of scattered electrons off of a rotating nickel target and was the Davisson-Germer experiment. The two parts of this principle are related by an equation introduced by de Broglie **(de-BRUEY)**, which states that wavelength equals Planck's constant over momentum. For 10 points, name this principle that applies to all matter, which is exemplified by light that can be identified as both an oscillation in an electromagnetic field and as a photon.
ANSWER: **wave-particle duality** [or **particle-wave duality**]

11. His brother is a brilliant but lazy person who hangs out at the Diogenes Club. When this character first meets his future friend, he asks "you have been in Afghanistan, I perceive?" In "The Final Problem," this man and his criminal nemesis seemingly die at Reichenbach Falls. The protagonist of the novel *A Study in Scarlet*, this man lives with a physician at 221B Baker Street. For 10 points, name this brilliant detective created by Arthur Conan Doyle who partners with Dr. Watson.
ANSWER: **Sherlock** Holmes [or **Holmes**]

12. A native of this country mediated peace talks during the Cuban Missile Crisis and became Secretary-General after Dag Hammarskjold **(HAM-mar-scold)** was killed in a plane crash. In this country, the student-led 8888 Uprising was suppressed after Ne Win's resignation. This homeland of U Thant is also home to the National League for Democracy, whose leader was placed under house arrest by its military junta. For 10 points, name this Southeast Asian country home to Aung San Suu Kyi.
ANSWER: **Myanmar** [Republic of the Union of **Myanmar**; or **Burma**; or Pyidaunzu Thanmada **Myama** Nainngandaw]

13. This province's northeastern boundary was adjusted by a 1927 commission appointed by the Privy Council, and runs through the Torngat Mountains, which contain the peak of D'Iberville. The northern part of this province, known as Nunavik, borders Labrador. Within this province, the St. Lawrence River runs through the city of Trois-Rivières **(TWOY wiv-ee-AHR-uh)** and past the Plains of Abraham. For 10 points, name this Canadian province which contains Montreal and speaks French.
ANSWER: **Quebec**

14. This deity offers Telemachus advice and counsel throughout the *Odyssey*. This deity transforms Medusa into her snake-haired form and, like Zeus, later wields a shield adorned with the head of Medusa, called the Aegis **(EE-jiss)**. This goddess competes with Aphrodite and Hera in the Judgment of Paris. This goddess is so offended by the sight of tapestries mocking the gods that she transforms Arachne into a spider. For 10 points, name this virgin goddess of wisdom in Greek mythology.
ANSWER: **Athena** [or **Minerva**]

15. A king with this name was killed in the "harem conspiracy" at Medinet Habu. Another ruler with this name signed the oldest known peace treaty with Hattusili **(hat-two-SILLY)** III. A king with this name had a consort named Nefertari. Pharaohs with this name waged war with the Sea Peoples, ordered the construction of the Abu Simbel complex, and fought the Hittites at the Battle of Kadesh. For 10 points, give this name of eleven pharaohs, whose second holder was known as the "Great"?
ANSWER: **Ramesses** [or **Ramses**; or **Rameses**]

 **2016 VHSL Conferences - Round 05 - Directed Period**

1A. What liquid circulating in the brain's ventricles is collected in a lumbar puncture?
ANSWER: **cerebrospinal fluid** [or **CSF**]

1B. What element has the highest known boiling point of all metals and has symbol W?
ANSWER: **tungsten**

2A. The Greek War of Independence claimed the life of what English poet, known for poems like "She Walks in Beauty" and "The Destruction of Sennacherib"?
ANSWER: Lord **Byron** [or George **Gordon**, Lord Byron]

2B. The consumption of a tea-soaked madeleine begins what epic Marcel Proust novel, which includes volumes like *The Fugitive* and *Swann's Way*?
ANSWER: ***In Search of Lost Time*** [or ***Remembrance of Things Past***; or ***À la recherche du temps perdu***]

3A. This is a 20-second calculation question. Calculate the t-statistic to test the null hypothesis that the mean of a normally distributed random variable is 5, given 9 data points with sample mean 7 and sample standard deviation 2.
ANSWER: **3**

3B. This is a 20-second calculation question. Find all real solutions to the equation e to the quantity 2 x minus 3 end quantity equals 1.
ANSWER: **{3/2}** [or **x equals 3/2**; or x equals **1.5**; do not accept answers with more or fewer than one value]

4A. Collagen is made of fibrils wound into a triple one of these shapes, whose alpha form contrasts with beta sheets in the secondary structure of proteins.
ANSWER: **helix** [or **helices**]

4B. What current president of Mexico was the target of the "Yo Soy 132" protest movement?
ANSWER: Enrique **Peña Nieto** [do not prompt on partial answer]

5A. What symphonic poem by Paul Dukas is based on a Johann Wolfgang von Goethe ballad in which a novice magician wreaks havoc with some brooms?
ANSWER: *The* ***Sorcerer's Apprentice*** [or *L'****apprenti sorcier***]

5B. The westernmost and northernmost points in the contiguous U.S. are both found on what peninsula, found across Puget Sound from Seattle?
ANSWER: **Olympic** Peninsula

6A. What political party was founded by Plutarco Elias Calles and ruled Mexico until Vicente Fox won the presidency in 2000?
ANSWER: **PRI** [**Partido Revolucionario Institucional**; or **Institutional Revolution Party**]

6B. John the Fearless and Philip the Good were dukes of what French region, which gave its name to a party that engaged in a civil war with the Armagnacs towards the end of the Hundred Years' War?
ANSWER: Duchy of **Burgundy**

7A. What kind of brief quotation is frequently found just before the start of a longer piece of writing?
ANSWER: **epigraph**

7B. In German, the "W-Wörter" **(vay-VOR-ter)** pronouns, including "wer" **(VAIR)** and "was" **(VAHS)**,are used to create what kind of sentences?
ANSWER: **question**s [or **interrogative** sentences]

8A. This is a 30-second calculation question. Two sides of an isosceles triangle measure 8 inches and 12 inches. The cosine of the angle between the two known sides can be one-third or what other value?
ANSWER: **3/4** [or **0.75**; or **three-fourths**]

8B. This is a 30-second calculation question. What is the equation of the smallest circle that contains the points (-3, 3) **(negative three comma three)** and (5, 9) **(five comma nine)**?
ANSWER: **x minus 1** quantity **squared, plus y minus 6** quantity **squared, equals 25** [or **y minus 6**, quantity **squared, plus x minus 1** quantity **squared, equals 25**]

9A. A magical Finnish treasure called the Sampo is destroyed when it falls into what type of place ruled by the Norse gods Aegir and Njörd?
ANSWER: the **ocean** [accept obvious equivalents such as the **sea**; prompt on **water**; do not accept "rivers," "lakes," etc.]

9B. What campaign to the Holy Land was initiated by the 1095 Council of Clermont, where enthusiastic Christians responded to a speech of Urban II with shouts of "God wills it!"?
ANSWER: **First Crusade**

10A. The title character visits Grandmother Willow along with the raccoon Meeko before singing "Colors of the Wind" in what Disney animated film?
ANSWER: ***Pocahontas***

10B. Leonard Bast dies after a bookcase falls on him in what E.M. Forester novel that also features the Schlegel family and is titled for Ruth Wilcox's estate?
ANSWER: ***Howards End***

 **2016 VHSL Conferences - Round 05 - Third Period, Fifteen Tossups**

1. The protagonist of this movie causes the floating Eiffel Tower to turn upside-down. Later in it, the "shusher" is used by Kyle to depose the captain of a ship. This film adapts a book by Adam Rex called *The True Meaning of Smekday*, and it features a cat named Pig who belongs to a character voiced by Rihanna. For 10 points, name this 2015 animated film depicting a brief conflict between the Gorg and the Boov, which is peacefully resolved by the Jim Parsons-voiced Oh, a gap-toothed purple alien.
ANSWER: ***Home***

2. In a story by this author, a German army officer goes mad after mistakenly betting on the title card. Evgenii **(ev-GAY-nee)** curses the title statue in this author's narrative poem *The Bronze Horseman*. This author of "The Queen of Spades" invented a sonnet stanza in iambic tetrameter for a verse novel whose title character kills Lensky in a duel after attending Tatyana's name day celebration. For 10 points, name this Russian poet who wrote the verse novel *Eugene Onegin* **(oh-NAY-gin)**.
ANSWER: Alexander Pushkin [or Alexander Sergeyevich **Pushkin**]

3. The movement of some of these structures is mediated by t- and v-SNAREs. Many of these structures are packed inside late endosomes **(EN-doe-sohms)**. Molecules like acetylcholine **(ah-see-tul-KO-leen)** are released after a type of these structures transports them to and then fuses with the presynaptic **(pre-sin-AP-tic)** plasma membrane during exocytosis **(ex-oh-sy-TOE-sis)**. For 10 points, name these fluid-filled lipid membrane-enclosed cellular structures used for secretion.
ANSWER: **vesicle**s [prompt on **endosomes** before it is read]

4. A presidential residence known as The Pines and a namesake castle are found in this city's Chapultepec Park. Its Lake Xochimilco **(shoh-chee-MEEL-coh)** is home to a salamander which does not undergo metamorphosis and is critically endangered in the wild, the axolotl. Lake Texcoco was drained to make room for the growth of this city, which was built on the site of the Aztec capital of Tenochtitlan **(tay-NOK-teet-lahn)**. For 10 points, name this capital of a country south of the U.S.
ANSWER: **Mexico City** [or **Ciudad de México**]

5. Bela Bartok’s concerto for this instrument was completed by Tibor Serly after Bartok's death. This instrument is the highest-sounding instrument in Bach's *Brandenburg Concerto no. 6*. A piece featuring this instrument ends with the "Orgy of Brigands" and was rejected for having too many rests by Niccolo Paganini. Hector Berlioz's *Harold In Italy* was written for this instrument, which uses the alto clef. For 10 points, name this string instrument which is tuned a fifth below the violin.
ANSWER: **viola**

6. A mosaic depicting a battle won by this leader was found in the House of the Faun in Pompeii. This person was the son of a king whom he fought with at the Battle of Chaeronea. This man won the Battle of Issus during his war with Darius III. This king's horse Bucephalus was killed during his invasion of India. The Diadochi **(dye-AH-duh-key)** generals of this king divided up his empire after his death in 323 BCE. For 10 points, name this Macedonian king known for his conquests.
ANSWER: **Alexander** the **Great** [or **Alexander III**; or **Alexandros** for **Alexander**; prompt on **Alexander** or **Alexandros**]

7. If a function *f* lies strictly between functions *g* and *h*, and this operation for *g* and *h* gives *L*, then this operation for *f* also gives *L* by the squeeze theorem. If one encounters an indeterminate form while performing this operation, one can differentiate the numerator and denominator according to L'Hopital's rule. For 10 points, name this mathematical operation that allows one to determine what a function's output approaches as the function gets close to some point, and which is symbolized "lim."
ANSWER: **limit** [or **lim** until it is read]

8. A film in this genre is about Ethan Edwards' quest to find his kidnapped niece. That movie in this genre is John Ford's *The Searchers*. A silent movie in this genre ends with a man pointing a gun at the audience. Another film in this genre features Will Kane's fear of Frank Miller's arrival on the noon train to join his old gang in seeking revenge. For 10 points, name this film genre which includes such films as *High Noon*, *The Great Train Robbery*, and *Stagecoach*, the latter of which stars John Wayne.
ANSWER: **western**

9. In November 2015, this country began planning a "social subsidy" to complement a three-billion euro bailout of four small banks. This country greatly reduced the power of its Senate in 2015, under a prime minister who defeated a comedian's Five Star Movement to win election. This country's leader is often paired with Germany's chancellor as "Merkenzi." For 10 points, name this country where Matteo Renzi succeeded Silvio Berlusconi as prime minister in 2013.
ANSWER: **Italy** [or **Italian Republic**; or **Repubblica Italiana**]

10. During this period, the Organization Council assassinated Walter Rathenau for signing the Treaty of Rapallo. Soon after the creation of this government, Rosa Luxembourg led the Spartacist uprising. A wheelbarrow of money was needed to buy bread during this government's period of hyperinflation. This government ended after Reichstag Fire, when its final president, Hindenburg, gave full power to its chancellor. For 10 points, name this post-WWI republic that ruled Germany before the Third Reich.
ANSWER: **Weimar** Republic [or **Weimar** Germany; or **Weimarer** Republik]

11. This hero temporarily holds up the heavens to give Atlas time to fetch the golden apples of the Hesperides **(hess-"PAIR"-ee-deez)**. Later, he burns to death after he is tricked into putting on a shirt soaked in the blood of the centaur Nessus. Iolaus **(yo-LAY-uss)** assists this hero in his quest to cauterize the neck stumps of a monster which grows two more heads whenever one is cut off. For 10 points, name this demigod son of Zeus who slays the Hydra as part of his twelve labors.
ANSWER: **Heracles** [or **Hercules**]

12. This man is honored with gifts and by a scop telling the story of the Finnsburh episode. He is given the sword Hrunting **(RUN-ting)** by the skeptical warrior Unferth. This character jumps into a lake to fight a female, vengeance-seeking monster. He is aided by his relative Wiglaf in fighting a dragon that ultimately kills him. This hero of the Geats protects King Hrothgar's **(ROFF-gar's)** mead hall from a monster. For 10 points, name this hero from an Old English epic poem who slays Grendel.
ANSWER: **Beowulf**

13. An important molecular pump transports three atoms of this element out of the cell for every two potassium atoms transported in. Bleach is made by dissolving this element's hypochlorite salt, and this element is also the cation for soda ash, rock salt, and baking soda. It is found below hydrogen on the periodic table and is considered the lightest alkali metal. For 10 points, name this element found along with chlorine in table salt, whose symbol is Na.
ANSWER: **sodium** [or **Na** before mention]

14. This tribe was led by Billy Bowlegs, who signed the Treaty of Payne's Landing on behalf of this tribe. It began clashing with the United States after the signing of the Adams-Onis Treaty. This tribe performed the Dade Massacre, kicking off a war during which it was led by Chief Osceola **(oss-ee-OLE-ah)**. It fought Zachary Taylor at the Battle of Lake Okeechobee. For 10 points, name this American Indian tribe who fought three wars with the U.S. Army in modern-day Florida.
ANSWER: **Seminole** tribe

15. At a charade party in this novel, one character impresses everyone with her impression of Clytemnestra. In this novel, a character leaves a note asking his lover to elope with him on the eve of the Battle of Waterloo. In this novel, George Osborne marries on the advice of Dobbin despite his father's protestations. This novel contrasts Amelia Sedley with the heady and intelligent Becky Sharp. For 10 points, name this "Novel without a Hero" written by William Makepeace Thackeray.
ANSWER: ***Vanity Fair****: a Novel without a Hero*

 **2016 VHSL Conferences - Round 05 - Tiebreaker Questions**

1. This man wrote a novel in which a poet must marry a woman in order to avoid hanging after he enters the Court of Miracles. In one of this author's novels, a man almost steals a bishop’s candlesticks after being released from prison for stealing bread. This author created such characters as Inspector Javert, Jean Valjean **(ZHAHN val-ZHAHN)**, and the disfigured Quasimodo. For 10 points, name this French author of *Les Miserables* **(lay mee-zair-AHB)** and *The Hunchback of Notre Dame*.
ANSWER: Victor **Hugo**

2. When this ruler took the throne, he ordered the execution of the veteran general Joab. After his death, his kingdom was split in two thanks to his son Rehoboam **(reh-huh-BAHM)**. This author of the philosophical book Ecclesiastes once suggested a child should be cut in half in order to determine its mother. This ruler built the First Temple in Jerusalem and is credited with writing most of Proverbs. For 10 points, name this son of David, a biblical king of Israel known for his wisdom.
ANSWER: **Solomon** [or **Jedidiah**]

3. A logarithmic function always approaches a line of this orientation without crossing it. In astronomy, both the zenith and nadir lie in the orientation denoted by this term. The zeros of the denominator of a rational function correspond to an asymptote described by this term. The dependent variable goes on the axis described by this direction. For 10 points, identify this direction that conventionally corresponds to the y-axis, as opposed to the horizontal x-axis.
ANSWER: **vertical**

4. This artist's final major artwork includes a gas lamp and waterfall and is only visible through two peepholes. One of his works is a postcard of the *Mona Lisa* on which he drew a mustache and beard. This artist of *Étant donnés* and *L.H.O.O.Q.* painted a Cubist work which was called an “explosion in a shingle factory” after its appearance at the 1913 Armory Show. For 10 points, name this Dada artist who exhibited everyday objects as "readymades" and painted *Nude Descending A Staircase, No. 2.*
ANSWER: Marcel **Duchamp**

5. This ruler's brother encouraged a revolt of Army officers in the February 26th Incident. This leader authorized the development of poison gas weapons by his country's Unit 731. This ruler asked his people to "endure the unendurable" and surrender in his "Jewel Voice Broadcast." This leader was not prosecuted for war crimes, unlike his Prime Minister, Hideki Tojo. For 10 points, name this father of Akihito who served as Emperor of Japan during World War II.
ANSWER: **Hirohito** [Michinomiya **Hirohito**; or the **Showa** Emperor]

What play by Harold Pinter ends with the hitman Ben presumably killing Gus after the two men receive mysterious orders through the title device?
ANSWER: *The* ***Dumb Waiter***

An isosceles trapezoid has bases of length 10 and 20 centimeters, and two legs of length 13 centimeters. What is the trapezoid's area?
ANSWER: **180** square centimeters