**VHSL Conferences 2016-2017 - Round 04 - First Period, Fifteen Tossups**

1. A bay named after these animals borders the westernmost point of Australia. The meat of this animal is fermented in a smelly Icelandic dish called *hakarl*. A "bull" type of this animal unusually lives in the Zambezi River and Lake Nicaragua. Many conservationists criticize a Chinese soup containing the fins of these animals. For 10 points, name these fish whose species include hammerhead and great white.
ANSWER: **shark**s [or ***Selachi****morpha*; prompt on fish]

2. A torus is the Cartesian product of two of these figures. They can be represented parametrically by the pair of equations x equals r times sine of theta and y equals r times cosine of theta. The proof that pi is not the root of a polynomial with rational coefficients implied that it is impossible to construct a square with an area equal to one of these figures. For 10 points, name these figures with constant radius and which have circumference equal to two pi times the radius.
ANSWER: **circle**s

3. This writer agreed to be a subject of a Humphry Osmond experiment with mescaline, which led to the composition of his book *The Doors of Perception*. The beginning of a novel by this author describes Bokanovsky Process, a cloning method used to produce Alphas and Betas. He wrote a novel set in the 26th Century that ends with the suicide of John the Savage in an abandoned lighthouse. For 10 points, name this author of the dystopian novel *Brave New World*.
ANSWER: Aldous **Huxley**

4. This character becomes an Iranian ambassador and murders Jason Todd in the story "A Death in the Family." He is responsible for shooting and paralyzing Barbara Gordon, the daughter of the police commissioner. This character was a former comedian who fell into a vat of chemicals that disfigured him and drove him insane. His usual sidekick is a woman named Harley Quinn. For 10 points, name this green-haired Batman villain named for a playing card.
ANSWER: The **Joker** [or **Jack**; or **Napier**]

5. The Taylor series for this function includes an infinite number of odd powers of x. This function is multiplied by the imaginary unit in Euler's formula and gives the y-value of a point on the unit circle. This function squared plus cosine squared is always equal to one, and dividing this function by cosine gives the tangent. For 10 points, name this function of an angle that is given as the ratio of opposite over hypotenuse.
ANSWER: **sine**

6. This poet imagines "gazing on the new soft-fallen mask of snow upon the mountains" in a love sonnet addressed to a "bright star." Another of his poems describes a "season of mists and mellow fruitfulness." This author of "To Autumn" wrote, "Beauty is truth, truth beauty," at the end of a poem about a vase that he calls a "still unravish'd bride of quietness." For 10 points, name this Romantic poet of "Ode on a Grecian Urn."
ANSWER: John **Keats**

7. This text notes early on that the "Pope and Czar (ZAR)" have "entered into a holy alliance to exorcise" a threat. This text begins by noting that "a spectre (SPEKTOR) is haunting Europe" before moving into a section about the "bourgeois (booj-WAH) and proletarians." It concludes by saying "working men of all countries, unite!" For 10 points, what 1848 pamphlet by Friedrich Engels and Karl Marx lends its name to a left-wing political party?
ANSWER: *The* ***Communist Manifesto*** [or ***Manifesto of the Communist*** *Party*]

8. This man's followers were part of a school named for his habit of walking while talking. This founder of the peripatetic school of philosophy proposed that the highest aim in life was "eudaimonia" (yoo-DAY-uh-MOAN-ee-uh) or "happiness." This man served as the personal tutor of Alexander the Great. For 10 points, what ancient Greek philosopher and student of Plato wrote the *Nicomachean (NICK-oh-MOCK-ee-UNN) Ethics*?
ANSWER: **Aristotle**

9. This country tried to modernize itself during the White Revolution, a movement pushed by a leader who used the SAVAK secret police. The capital of the Safavid Dynasty was in this country, which was ruled from 1925 to 1979 by the Pahlavi dynasty. By far, the largest global percentage of people who practice Shia Islam live in this country. For 10 points, what country featured the Shah being ousted by the Ayatollah Khomeini (COE-may-NEE)?
ANSWER: Islamic Republic of **Iran** [prompt on Persia]

10. After events in this city, Operation Wrath of God sought to punish Black September members. This city was where an agreement was signed allowing the annexation of the Sudetenland (SUE-day-TEN-land) in Czechoslovakia (CHECK-oh-SLOW-vock-EE-uh). Eleven Israeli athletes were killed during this city's hosting of the 1972 Summer Olympics. For 10 points, what Bavarian city hosted a 1938 conference in which European powers tried to appease Hitler?
ANSWER: **Munich**

11. If an infinite series has a weaker form of this property then it can be rearranged to obtain any value by the Riemann series theorem. Every bounded sequence has a subsequence with this property by the Bolzano-Weierstrass theorem. Having this property is equivalent to a sequence being Cauchy. One is often asked to determine the radius of this property for a power series. A sequence can be proven to have this property using epsilon-delta techniques. For 10 points, name this property of sequences that have limits, contrasted with divergent.
ANSWER: **convergent** [or **convergence**, or it **converge**s]

12. A painting in this building includes twenty male nude figures called *ignudi* in between its sections. After the Council of Trent, a fresco in this building was censored with fig leaves. A painting in this building includes a red cloak behind God, who reaches out to a nude, reclining Adam. Pope Julius II commissioned the massive *Last Judgment* fresco in this building. For 10 points, name this building whose ceiling was painted by Michelangelo.
ANSWER: **Sistine Chapel**

13. Transitions to this quantum level in a hydrogen atom form the Balmer series of spectral lines. This positive number is the principal oxidation state of strontium, cadmium, and zinc. The group on the periodic table denoted by this number is the alkaline earth metals, and includes calcium. Up to this many electrons can occupy a single orbital, according to Pauli's exclusion principle. For 10 points, what is the number of carbons in ethene and of hydrogens in water?
ANSWER: **two**

14. This empire suffered one of its worst defeats at the Battle of Zenta. Prior to World War One, it was referred to as the "sick man of Europe" because of its declining status. In the Auspicious Incident, this empire disbanded its once elite Janissary corps. In the 1890's, it massacred thousands of Armenians. Under Mehmed the Conqueror, this empire finally conquered Constantinople in 1453. For 10 points, name this empire based in modern-day Turkey.
ANSWER: **Ottoman** Empire [prompt on Turkish Empire]

15. In a novel by this author, the protagonist is taken across a river for free by a ferryman who predicts that he will someday return to compensate him in another way. He described the rise of Joseph Knecht through the Castalian hierarchy in his novel *The Glass Bead Game.* This writer's pen name was Emil Sinclair, who is the protagonist of his novel *Demian.* For 10 points, name this German author who wrote about a man who attains enlightenment in *Siddhartha*.
ANSWER: Hermann **Hesse** (HESS-uh)

 **VHSL Conferences 2016-2017 - Round 04 - Directed Period**

1A. The traitorous Vidkun Quisling became head of what European country after agreeing to support the Nazi invaders?
ANSWER: Kingdom of **Norway**

1B. Which curve is the solution of the brachistochrone and tautochrone problems and is drawn by a point on the rim of a circle rolling along a line?
ANSWER: **cycloid**

2A. Jose Arcadio Buendia (bwen-DEE-uh) founds what town that is the setting of Gabriel Garcia Marquez's novel *One Hundred Years of Solitude*?
ANSWER: **Macondo**

2B. What square number is the only even square of a prime number?
ANSWER: **four**

3A. This is a 20-second calculation question. In a right triangle with sides of length 8, 15, and 17, what is the length of the altitude that is perpendicular to the hypotenuse?
ANSWER: **120/17** or **7 and 1/17** [By considering the area formula, this altitude's length is the product of the legs divided by the hypotenuse.]

3B. This is a 20-second calculation question. A certain equilateral pentagon has all sides of length 2 and angles measuring, in order, 90, 90, 150, 60, and 150 degrees. What is its area?
ANSWER: **4** **plus** the square **root** of **3** (accept the terms in either order) [The pentagon is made up of a square and an equilateral triangle, so its area is 2^2+2^2\*sqrt(3)/4=4+sqrt(3).]

4A. What Irish playwright wrote *Arms and the Man* and *Pygmalion*?
ANSWER: George Bernard **Shaw**

4B. What language, whose name is derived from the Arabic for "coast," is spoken in Kenya, Tanzania, and other East African countries?
ANSWER: **Swahili**

5A. The Red Baron was a German hero during what war?
ANSWER: **World War One** [or **First World War**]

5B. What mathematical proof technique involves proving a base case and then extending the base case to apply more generally?
ANSWER: mathematical **induction**

6A. The mysterious Sea Peoples attacked what ancient kingdom near the end of the Bronze Age?
ANSWER: **Egypt** [or **Egyptian** kingdom; or the **New Kingdom**]

6B. A soliloquy (SOLE-lil-uh-QUEE) and an aside are dramatic techniques that involve speaking roles for how many characters?
ANSWER: **one**

7A. Bowler hats and apples are common motifs in the paintings of what Surrealist artist, who included both in *The Son of Man*?
ANSWER: René **Magritte** [or René François Ghislain **Magritte**]

7B. What female gymnast set an American record in women's gymnastics by winning four gold medals at the 2016 Olympics?
ANSWER: Simone **Biles**

8A. This is a 30-second calculation question. If a fair six-sided die is rolled three times, what is the probability that each roll is a different number?
ANSWER: **5/9** [or **20/36** or **120/216**] [The second roll is different from the first 5/6 of the time, and after that the third roll is different from the first two 4/6 of the time, so we multiply 5/6\*4/6.]

8B. This is 30-second calculation question. Find the roots to the equation three-x-cubed plus x-squared minus twelve-x minus 4 equal to zero.
ANSWER: x=**2**, x=**-2**, x=**-1/3** [use factor by grouping to get (x)(3x+1) = 0]

9A. The war god Huitzilopochtli (HOOTZ-uh-lo-POCK-lee) and the rain god Tlaloc (THAH-lock) were two of the main deities of which Mesoamerican civilization?
ANSWER: **Aztec**s [or **Mexica**]

9B. Lord Byron died in a war of independence fought in which modern-day European country?
ANSWER: **Greece**

10A. In 2016, Pippa, the sister of what Duchess of Cambridge, had her iPhone hacked?
ANSWER: **Catherine** [or Catherine **Middleton**; or Kate **Middleton**]

10B. What capital of Syria is one of the oldest continually inhabited cities in the world?
ANSWER: **Damascus**

 **VHSL Conferences 2016-2017 - Round 04 - Third Period, Fifteen Tossups**

1. The multiplication of these objects is famously not commutative, meaning you cannot switch the order in which they are multiplied. The identity example of these objects is square and has ones down its diagonal. These objects can be used to solve systems of linear equations by row reduction. The expression *a d* minus *b c* gives the determinant of a two-by-two one of these objects. For 10 points, name these rectangular arrays of numbers.
ANSWER: **matrices** [or **matrix**]

2. The protagonist of a play by this author ensures the passage of a peace deal by holding a basket of charcoal as a hostage. In a play by this writer, jugs of water are dumped on a chorus of old men, and a group of women seize power and withhold sex from their husbands until the men agree to stop the Peloponnesian War. For 10 points, name this ancient Greek master of Old Comedy who wrote *The Acharnians*, *The Clouds*, *The Frogs*, and *Lysistrata*.
ANSWER: **Aristophanes** (air-ih-STAHF-uh-nees)

3. Functions are described by this adjective if their second derivative is not negative. For functions described by this term, or this term suffixed with "downward", a line segment between any two points on the graph of the function must lie above or on the graph, such as for the function *y* equals *x* squared. This adjective is also applied to polygons whose internal angles are all less than 180 degrees. For 10 points, what term from mathematics is the opposite of concave?
ANSWER: **convex**

4. Every theme in this composer's *American* String Quartet is based on a pentatonic scale. This composer's Symphony No. 9 is best-known for the English horn solo in its Largo second movement. The *Slavonic Dances* are by this composer, who imitated the folk music of African-Americans and Native Americans in his last symphony, which he wrote while on a vacation in the United States. For 10 points, name this composer of the *New World* Symphony.
ANSWER: Antonín **Dvořák** (duh-vor-JACK) [or Antonín Leopold **Dvořák**]

5. A character in this novel proposes to a woman for the second time while playing a word game with her at a dinner party. As this novel opens, Stiva deals with the fallout from his affair with his child's governess, which has produced an "unhappy marriage." The protagonist of this novel leaves her husband Alexei after falling in love with Count Vronsky. For 10 points, name this novel whose title character throws herself in front of a train, a work of Leo Tolstoy.
ANSWER: ***Anna Karenina***

6. In 1977, this country's Janata Party finally toppled the reign of the Congress Party. Its first Prime Minister gave a speech saying years ago "we made a tryst with destiny." After Operation Blue Star, a leader of this country was murdered by her own bodyguards, leading to violent anti-Sikh (SEEK) riots. This country supported the future Bangladesh in its independence war with Pakistan. For 10 points, name this Asian country once led by Indira Gandhi.
ANSWER: Republic of **India**

7. During this decade, the Dayton Agreement ended a bloody European conflict. A three-year-long siege during this decade killed thousands when the Serbs viciously bombed Sarajevo during the Bosnian War. The Kosovo War also took place in this decade, and Boris Yeltsin became the first President of Russia during this decade. For 10 points, the beginning of what decade featured the break-up of both Yugoslavia and the Soviet Union?
ANSWER: The **1990's** [prompt on Nineties]

8. A cast member on a show set at this type of place, Isaiah Washington, departed after calling a fellow actor a homophobic slur. The first major television show created by Shonda Rimes is set at this type of location in Seattle. Ellen Pompeo plays Meredith, the love interest of Patrick Dempsey's "McDreamy," on a show set at one of these locations. For 10 points, the show *Grey's Anatomy* takes place in what kind of location?
ANSWER: a **hospital**

9. Ganymede's (GAN-im-eed's) home town was this city, whose king Laomedon (lay-AH-meh-dahn) employed Zeus and Poseidon to help construct its walls. A military force that is on its way to attack this city is described in the Calalogue of Ships. A hero who fights for this city has his body dragged around its perimeter after being killed by Achilles. For 10 points, name this home of Hector that is sacked after it accepts a gift of a wooden horse.
ANSWER: **Troy** [or **Ilium**; or **Ilion**; or **Ilios**]

10. This organization effectively supplanted Enrico Mattei's "Seven Sisters" group. Despite having no members in Europe, it is based in Vienna, Austria. Indonesia is the only member of this group located in Southeast Asia, and Sudan has recently applied to join. In 2016, this group declared an intention to cut production for the first time in eight years. For 10 points, what 14-member organization controls 73 percent of the world's oil reserves?
ANSWER: **OPEC** [or **Organization of the Petroleum Exporting Countries**]

11. Jurgen Stroop's report documents the German destruction of a neighborhood in this city. In 1979, in this city's Victory Square, Pope John Paul II conducted a Holy Mass during his first return to his home country. This city's ghetto featured the largest Jewish uprising against the Nazis during World War II. An Eastern European "pact" that was the Soviet version of NATO was named for this city. For 10 points, name this largest city of Poland.
ANSWER: **Warsaw**

12. This continent is the starting point of the myth explored in Claude Levi-Strauss' book *The Raw and the Cooked*. The documentary film *The Ax Fight* takes place on this continent and was produced by anthropologist Napoleon Chagnon (SHAG-nonn). This continent is the home of a society labeled "the fierce people" by Chagnon for displaying constant violence. For 10 points, what continent was the site of a study of the Yanomamo people, a society in the Amazon?
ANSWER: **South America**

13. Because of his exposure to measles, Ken Mattingly did not participate in a mission for this program. During preparations for the first mission in this program, three men, including Gus Grissom, were killed in a fire. This program featured three participants, instead of the one-man Mercury program. The eleventh mission in this program featured crew member Neil Armstrong. For 10 points, what NASA program succeeded in sending a man to the moon?
ANSWER: **Apollo** program [or Project **Apollo**]

14. Paintings of this country's peasants include *The Third-Class Carriage* and *The Gleaners*. A realist movement called the Barbizon School emerged in this country. An artist from this coutnry painted himself next to a nude model and a young boy inside his studio, and depicted a crowded funeral in his hometown of Ornans (OR-nahn). For 10 points, name this country where Gustave Courbet's paintings were shown at the Paris Salon.
ANSWER: **France** [or **French Republic**; or **République Français**]

15. Spas surround this country's Lake Héviz, whose water temperature exceeds 100 degrees Fahrenheit. This country's cuisine often incorporates paprika, including in a stew called goulash (GOO-losh). This country is mostly inhabited by the Magyar people. This country's capital was once two separate cities on opposite sides of the Danube River. For 10 points, name this central European country led from Budapest that was once united with Austria.
ANSWER: **Hungary** [or **Magyarország** until "Magyar" is read]

 **VHSL Conferences 2016-2017 - Round 04 - Tiebreaker Questions**

1. These people's navy carried out the humiliating Raid on the Medway in 1667. In 1602, a company run by these people became the first to issue stock. They created a namesake republic after winning independence in the Eighty Years War against Spain. These people fought the British during the 1600's and 1700's, and like the British, ran a namesake "East India Company." For 10 points, what people live in the Kingdom of the Netherlands?
ANSWER: **Dutch**

2. This mathematician names a theorem with Bonnet relating curvature to topology. He published six different proofs of the law of quadratic reciprocity and complex numbers with integer real and imaginary parts are named for him. The method of reducing matrices to row-echelon form is named for Jordan and this mathematician. Legend claims that when he was a child he stunned his teacher by quickly adding up the numbers 1 through 100. For 10 points, name this German mathematician for which the normal distribution is sometimes named.
ANSWER: Carl Friedrich **Gauss**

3. In this novel, a controversy erupts after an Elder's body begins to stink within a day of his death. A parable within this novel, which imagines that Jesus's second coming was interrupted by the Spanish Inquisition, is called "The Grand Inquisitor." In this novel, a man is arrested for the murder of his father while planning his wedding with Grushenka. For 10 points, name this novel whose title characters are Dmitri, Ivan, and Alyosha, by Fyodor Dostoyevsky.
ANSWER: *The* ***Brothers Karamazov*** [or ***Brat'ya Karamazovy***]

4. Shortly before marrying his wife, this composer wrote the violin piece "Salut d'Amour" (sah-LWEE dah-MOOR) for her. He wrote a Cello Concerto in E minor, and depicted his friend Augustus Jaeger as a mighty hunter in the "Nimrod" movement of his *Enigma Variations*. This composer wrote a set of six marches that are often performed at American graduation ceremonies. For 10 points, name this composer of the *Pomp and Circumstance* marches.
ANSWER: Edward **Elgar**

5. This landmark is engraved with the names of 72 scientists painted in gold. Apollinaire wrote a poem arranged in the shape of this landmark that claims that it "pokes forever at the Germans." The orange-and-white Tokyo Tower is modeled after this landmark, whose namesake built the Statue of Liberty. This landmark was built as an entrance piece for the 1889 World's Fair. For 10 points, name this massive iron tower, the tallest structure in Paris.
ANSWER: **Eiffel Tower** [or **Tour Eiffel**]

Find the sum of the solutions to the equation 3 x squared plus 7 equals 12 x.
ANSWER: **4** [Rewrite the equation as 3x^2-12x+7=0. By Vieta's Formulas, the sum of the solutions is -(-12)/3=4.]

According to the Gospels, what Roman governor presided over the trial and crucifixion of Jesus Christ?
ANSWER: Pontius **Pilate**