RTO 2015
Round 7 - Tossups

1. **This subarea of algebra was first introduced in 1847 in a book named *The First Mathematical Analysis of Logic*. The use of Hasse diagrams shows that these types of algebra are recursive. The values of *x* AND *y*, *x* OR *y*, and NOT *x* can be expressed by tabulating their values with truth tables. When trying to add 1+1 in this area of algebra, the answer is** (*) one. This is because the nature of the answers are always true or false, never in between or neither. This is the fundamental basis of digital electronics and is in all modern programming languages. For ten points, name this type of algebra that only uses 1 and 0 and is usually used in the context of logic.

    Boolean Algebra

2. **This element was first discovered by William Ramsay and Morris Travers after they removed nitrogen, oxygen, argon, and krypton from air. It is created in stars through the fusion of oxygen and helium. Despite being the fourth most abundant element in the universe, it is quite rare on Earth since it does not form any known** (*) solid compounds. Out of all the elements, this one emits the brightest light when energized with normal voltages. FTP, name this 10th element on the periodic table commonly used in advertisement signs, with symbol Ne.

    Neon (accept **Ne** before mentioned)

3. **This system was originally devised from 21 of the 26 Etruscan characters. This system's "O" character was derived from an Egyptian hieroglyph resembling an eye, and its "N" from a hieroglyph resembling a snake. This alphabet began to replace the *futhorc* runes in 7th-century** (*) England, though symbols like thorn and aesc ("ash") were used with this alphabet for some time. The invention of Carolingian minuscule introduced into this alphabet the practice of putting spaces between words and the distinction between capital and lowercase letters. For ten points, name this alphabet used for English and a namesake Roman language.

    Latin alphabet

4. **The value of this constant was first calculated by Johann Josef Loschmidt so it is sometimes abbreviated by a capital L. First measured by coulometry, it is now based on x-ray diffraction of a crystal silicon lattice. It equals the** (*) Faraday constant divided by the elementary charge, or the ideal gas constant divided by the Boltzmann constant. It is defined as the number of atoms in 12 grams of carbon-12 and has a value of approximately 6.02 times 10 to the 23rd power. FTP name this constant, the number of molecules in a mole.

    Avogadro's constant (accept **Avogadro's** number)

5. **This painting depicts a tree or flower surrounded by a halo, possibly representing the tree of life. In the background, 5 buildings are depicted but two of them are upside down. One of these buildings is a church with a face inside. A person in this painting is wearing a necklace with** (*) beads and a cross. That person is entirely green. A goat is also depicted, while another goat being milked is visible on its cheek. A man with a scythe is next to an upside down woman pointing him the way. FTP, name this painting of the artist's childhood hometown, a masterpiece by Marc Chagall.

    I and the Village

6. **In the field of infinitesimal calculus, this mathematician is well known for the development of power series summations. He worked widely in mathematical physics, including the areas of beam bending and fluid mechanics. This mathematician also defined his eponymous (*)** Zeta function which is written as an infinite product. This man was also a cartographer and blamed his serious vision problems on his tedious work. This man popularized the use of the symbol pi to denote the circumference of a circle. FTP name this mathematician whose namesake number is the base for the natural log.

   Euler

7. **In Greek Orthodoxy, this biblical character is credited with writing the Axion Estin hymn. Mormons believe that Noah is identical to this biblical character. In an early appearance, he claims to have been restrained for 21 days by the Prince of Persia. In Islam, his hadith contains the most explicit summary of the Five Pillars. In the Gospel of Luke, this character turns (*)** Zacharias mute for saying that his wife Elizabeth is infertile. This character calls another "blessed...among women" before predicting the birth of a descendant of David. FTP, name this archangel who announced the birth of Christ and will blow his horn at the end of the world.

   Gabriel

8. **In the Iliad, Agamemnon has an image of a three headed one on his breastplate. Slavs used the masculine form of the word snake to describe these creatures. They are known as ryu in Japanese, and these creatures are the only mythical creatures on the Chinese (*)** Zodiac. Western versions were often depicted as malevolent, while Eastern ones usually controlled rain and were mostly benevolent to humans. FTP, name these creatures like Nidhogg, Fafnir, and Ladon, which are usually seen flying around kidnapping princesses while burning hapless humans and their puny villages.

   Dragons

9. **The positive form of this phenomenon produces large quantities of very low frequency and extremely low frequency radio waves, while the more common negative type is initiated by a stepped leader. One type of this phenomenon is known as "Anvil Crawler," while other types include ribbon, rocket, staccato, (*)** forked, and superbolts. This phenomenon can be induced by volcanoes, and can be in CC, CG, or IC varieties. It also creates rocks known as fulgurite. The German for it is "blitz." FTP, name this sudden flow of electricity that occurs during thunderstorms.

   Lightning

10. **In this painting, one man stands out from all the rest because of the red color and length of his tunic. In the background, hills and trees are visible in addition to a building. The subject of the painting is wearing a orange cloak on top of a blue garment. This (*)** fresco is designed to be viewed starting in the middle, then going to the left and then to the right as the subject of the painting performs the actions as described in Matthew 17:24-27. For ten points, name this painting that depicts Saint Peter finding a coin in a fish's mouth to pay a tax collector, a work by Masaccio.

    The **Tribute Money**

11. **One of this man's lesser known works was composed for the libretto of Samuel Humphreys in Jean Racine's** *Athalie.* **This composer's** *La Paix* **has a movement called "La Réjouissance" which was meant to celebrate the end of the (*)** War of Austrian Succession.

King George I wanted a concert on the River Thames, which is why this man composed *Water Music*. This man's perhaps most famous work includes the death and resurrection of Christ in Part Two. FTP, name this German-born English composer who wrote many oratorios including *Israel in Egypt*, *Solomon*, and *Messiah* with its notable "Hallelujah" chorus.

George Frideric **Handel**

12. **This political party was formed by Frances Willard, leader of the WCTU, and others. Although not the Democratic party, this political party also represented ideas such as (*)** distrust toward elites, more governmental action helping the majority of the people, and a silver currency alongside gold. This political party's Omaha platform called for direct election of senators and an eight-hour working day. In the 1896 election, both this political party and the Democratic party endorsed William Jennings Bryan. For ten points, name this short-lived political party in the United States that formed from the Farmers' Alliance, also called the People's Party.

    Populist Party

13. **One of this ballet's more technical dances includes a trepak dance followed by a group of pipers who perform en pointe to this ballet's "Dance of the Mirlitons." In Act One of this ballet, the protagonist uses a shoe to protect the title character after he is wounded in a battle. This battle is orchestrated by the the main character's grandfather, (*)** Drosselmeyer. At the end of the first act, snowflakes dance around beckoning to the prince and Clara before her visit to the land of sweets. FTP the Sugar Plum Fairy appears in what Tchaikovsky ballet in which Clara receives a toy that comes to life?

    The Nutcracker

14. **This character battles the forces of the cowardly Copper Knight, after which he finds his true name under a metal slab and takes over the castle of Dolorous Guard. While staying with King Pelles, he was tricked into sleeping with (*)** Elaine, resulting in the birth of his son Galahad, who eventually found the Holy Grail. He is sometimes nicknamed "of the lake" because he was raised by the Lady of the Lake, and in most sources, he is unable to find the Holy Grail because of his relationship with the wife of the king he served. FTP name this knight of the round table, best known for his adulterous love for Guinevere.

    Lancelot du Lac

15. **This magazine was founded in 1970 as a successor to the *Hara-Kiri* magazine. In 2007 it was involved in a court case regarding hate speech. In 2011 their office was (*)** fire bombed and attacked once again in 2012. The day after the most recent attack, the staff said that they would still release one million copies of the next weekly issue on time. That most recent attack on this magazine was by the Kouachi brothers, two Algerian brothers who self-identified as part of the Al-Qaeda branch in Yemen. FTP, name this magazine which ran cartoons depicting the Prophet Muhammad and was the site of a shooting by extremists on the 7th of January which left twelve dead.

    Charlie **Hebdo**

16. **An amendment to this act enlarged the Pell grant scholarship award, and the act itself created the independent payment advisory board. On February 3, the House passed a bill to repeal this law, and a vote is scheduled in the Senate in September. Sarah Palin previously claimed that the passage of this would result in the creation of (*)** "death panels." This law was partly modeled after the success of Mitt Romney's similar plan in Massachusetts. The

Supreme Court upheld this law as part of Congress' ability to levy taxes in National Federation of Independent Business v. Sebelius. FTP name this health care reform law, commonly called "Obamacare."

Patient Protection and **Affordable Care Act** (Accept **Obamacare** until mentioned)

17. **This figure was once brought back to life when her father applied a torch to her body. According to Ovid, this figure ran away from the sea god Glaucus after seeing his fish tail. Circe poisoned this figure and turned her into a monster. The idiom "between a rock and a hard place" partly refers to this figure. In the Odyssey, this figure kills (*)** six of Odysseus' crew. This figure by some accounts has a human upper body and barking dogs coming from her vagina, although she is more famously described as having six heads and twelve tentacles. FTP, name this monster from Greek mythology who lives at the top of a cliff across from Charybdis.

    Scylla

18. **One substance in this game is said to require a cubical storage system since it several times more powerful than its spherically stored counterpart. To upgrade one set of objects in this game to its final form would require approximately 225 payments of $10. A recent update to this game added things such as an (*)** aerial tank and coffins that release skeletons to attack. One building in this game shoots fireworks to attack while another uses beams of heat that shoot from either a lens or a platonic solid at the top. During a Super Bowl commercial for this game, Liam Neeson appears and gets revenge for the destruction of his village. FTP, name this mobile game by Supercell where players build armies to steal each other's resources.

    Clash of Clans

19. **Newton's law of this quantity is a constitutive equation because it is not a law of nature and only works for specific substances. The kinematic form of this quantity is measured in Saybolt Seconds Universal, degree engler, and (*)** stokes. Its dynamic version is measured in poise and pascal-seconds. At very low temperatures, superfluids have zero of this quantity. FTP, name this quantity that is the resistance of a liquid to deform under shear and tensile stress, of which honey has more than water.

    Viscosity

20. **There is technically no sum of this series since it is divergent, but it has been manipulated to have a significant value for various fields of mathematics and physics such as quantum field theory, string theory, and complex analysis. Ramanujan summation and zeta function regularization methods have been used to give this series a famous, seemingly illogical, value which is one of the (*)** fundamental statements for string theory. The nth partial sum of this series can be found with the summation formula $n(n+1)/2$ [say "n times quantity n + 1 divided by 2] and is the triangular number. FTP, name this series which has been assigned a value of -1/12 by some methods.

    The sum of **all natural numbers** (or **counting numbers**; prompt on "all/sum of numbers/integers" , accept obvious equivalents, like "all whole numbers"; must have some indication of "all" or "the sum of," or "set of"; do not accept answers like "<u>real</u> numbers."

21. **Hesiod advised that "it is not possible in any way to evade" this Greek god's mind. Ovid tells of this god turning ants into the Myrmidons for King Aeacus of Aegina. This god was raised at Mount Dikte and suckled by the nymph Amaltheia. He transformed the Arcadian King (*)** Lycaon into a wolf for trying to feed the god his own slaughtered child. This deity killed

Porphyrion for trying to rape his wife. For 10 points, name this supreme god of Olympus and Greek god of the sky and thunder.

Zeus (Do not accept <u>Jupiter</u>)

Bonuses – Round 7

1. FTPE, give the English name of the deadly sins given to you in Latin.

   A. Fornicatio

   Lust (for this and the others, accept any equivalents)

B. Superbia

   Pride

C. Acedia

   Sloth

2. FTPE, given a piece for an instrument, and someone who played it, name the instrument.

   A. Lalo's Symphonie espagnole in D minor, Op. 21. Jashca Heifitz played this instrument.

   Violin

B. Prokofiev's Symphony-Concerto, Op. 125. Mstislav Rostropovich played it.

   Cello or **violoncello**

C. Vivaldi's Concerto in F major for [this instrument], also known as La Tempesta di Mare. Geoffrey Gilbert played this instrument.

   Flute

3. Since the Civil War, there have only been three presidents whose party gained seats during a midterm election. Two did it in the 20th century and one has done it in the 21st century.

   A. Name all three presidents FTP each.

   Franklin D. **Roosevelt** (or **FDR**), Bill **Clinton**, and George W. **Bush** (accept "Bush 43"; prompt on "Roosevelt" and "Bush" for the first name (and initial, in the case of Bush))

4. Camels are really, really weird. FTPE, answer these biological facts about camels.

   A. Camels are the only animal to have cells of this type that still have their nucleus. The oval shape as opposed to the disk shape found in humans helps them to still carry oxygen throughout the body even when they're very dehydrated.

   Red blood cells or **erythrocytes**

B. Camels have a pad of thick tissue over this bone so that the camel's body doesn't have to be lying directly on the very hot sand. This bone is also called the breastbone.

   sternum

C.   These y-shaped proteins generally consist of a light chain and a heavy chain, but camels are really weird, so for them they have two heavy chains. This actually makes these molecules smaller and more durable.

antibodies or **immunoglobulin**

5.   FTPE, name each of these pillars of Islam.

A.   This pillar is performed while facing the Kaaba in Mecca, and is done five times a day.

Obligatory **Prayer** (accept Salat)

B.   This pillar is performed during the Islamic month of Dhu al-Hijjah at least once in a lifetime, and one ritual that is often performed for this pillar is the touching of the Black Stone.

Hajj (or Pilgrimage to Mecca)

C.   This Arabic word for a pillar means growth and purification since it lets the individual achieve balance and new growth. Name this form of the pillar alms-giving, a taxation on the wealth of an individual.

Zakāt

6.   For ten points each, answer these questions about Southeast Asian kingdoms.

A.   This kingdom reached its height under the rule of Suryavarman II in the twelfth century, before declining under pressure from the growth of Thai kingdoms to its west. This kingdom's capital contained a vast temple that is today the only building to be depicted on a national flag.

Khmer empire

B.   This kingdom gained its independence from China in 939. It survived Mongol invasions under the rule of the Tran dynasty, but in the 17th century, it split into two fragments, Cochin China and Tongking. Reunited in the late 18th century, it was annexed piecemeal by the French.

Vietnam or **Dai Viet** or **Annam**

C.   This Hindu kingdom had its capital at Vijaya. At the height of its power, it was able to sack both Angkor and Hanoi, but it was ultimately defeated and annexed by the Vietnamese kingdom of Cochin China in 1611.

Champa

7.   For ten points each, name these historians.

A.   This "Father of History" chronicled the Persian Wars but his unscientific method means that he can be unreliable, such as when he reports that giant gold-hoarding ants live in India, or one-eyed creatures in Russia, or headless people with their faces on their chests in Africa.

Herodotus

B.   Often seen as one of the first modern historians, this author of *The Decline and Fall of the Roman Empire* attributed the titular course of events to the adoption of theocracy by the Romans.

Edward **Gibbon**

C. This biographer's *Parallel Lives* sought to compare famous ancient Greeks with Romans, such as by pairing Alexander the Great with Julius Caesar, or Demosthenes with Cicero.

Plutarch

8. FTPE, name these facts about Wole Soyinka. (WOAL-ay shoy-INKA)

A. Wole Soyinka hails from this country, the same country as Chinua Achebe, currently run by Goodluck Jonathan.

Federal Republic of **Nigeria**

B. In this play by Wole Soyinka, based on a real event,Elesin, a man in the titular role, is prevented from committing ritual suicide by the colonial leaders.

Death and the King's Horseman

C. In another Wole Soyinka novel, Sidi is called this titular thing, which belies her beauty and how she is sought after by both Baruka and Lakunle.

the **Jewel**

9. FTPE, fill in the missing word or words in these well known lines of poetry.

A. The _____ writes; and, having writ, Moves on

Moving Finger

B. Things fall apart; the ____ cannot hold

centre

C. The proper study of mankind is _____

man

10. FTPE, name the titles of these famous works of art with dogs in them.

A. This work shows a cuddly and fluffy small brown dog between the two subjects, one of whom is pregnant and wearing a green dress and the other a serene man wearing a ridiculously huge hat.

The Arnolfini Wedding (accept *The Arnolfini Portrait*, *The Arnolfini Marriage*, or *"Portrait of Giovanni Arnolfini and his Wife")*

B. A tiny brown and white dog sleeps on the edge of a bed while in the background two women search through a chest full of riches. No one in the painting seems to care that the subject is a bit exposed.

Venus of Urbino

C. A greyhound-like white and black dog stands on the bottom right of this painting looking back at a mourning woman. Jesus crucified on the cross is visible in the background being held up by a religious attendant.

*A **Burial at Ornans*** (accept *A **Funeral at Ornans***)

11. How good are you with Egyptian Mythology? FTPE, name these Egyptian deities.

   A. This god is the son of Isis and Osiris. He is often depicted with the head of a falcon, and his namesake eye was a symbol of protection and royal power.

Horus

B. This possible daughter of Horus was given titles such as "she who mauls." This goddess is usually depicted with a lion's head and dressed in blood-red clothing. At one point, she had to be stopped from destroying humanity by giving her wine dyed blood-red.

Sekhmet

C. This god, the wife of Tefnut, god of the moist air, is the father of both Nut and Geb. He holds them apart, allowing for humans to exist. This god of the air is often depicted with an Ostrich feather.

Shu

12. FTPE, answer these questions about Dante's "Inferno."

   A. This is Dante's guide through hell who claims to have been sent by Beatrice

Virgil

B. In the forest, Dante meets a lion, a leopard, and this other animal.

She-**wolf**

C. This circle of hell has three inner rings and is guarded by a Minotaur.

7th or **violence**

13. FTPE, answer these questions about triangles

   A. This type of triangle has 2 sides of the same length

Isosceles

B. This type of triangle has interior angles in the ratio 1:2:3

30-60-90 Triangle

C. This type of triangle does not have a right angle and includes both obtuse and acute triangles.

Oblique

14. FTP, name these things about a late night talker.

A. This current host of "The Tonight Show" is also best friends with Justin Timberlake.

Jimmy Fallon

B. Jimmy Fallon is accompanied on stage by this man who provides sound effects and dialogue during the show.

Steve Higgins

C. In 2002 Fallon hosted these music awards. This channel is now known for providing programs that does not contain much music at all.

MTV Music Awards (Accept logical equivalents)

15. FTPE, answer these questions about a famous bridge.

A. This bridge, also known as Galloping Gertie, was built over its namesake strait in Washington. It finally collapsed after several months of being incredibly sketchy to drive across when wind caused it to shake in all directions.

Tacoma Narrows Bridge

B. The bridge fell apart due to this phenomenon that occurs when a system has increased amplitude at certain frequencies.

Resonance

C. The center frequency divided by the bandwidth gives this parameter that describes how under-damped a system is. Systems with high values for this quantity lose energy slowly.

Q factor or **quality factor**

16. Textbooks are sometimes famed for their cover photos. For ten points each, answer these questions relating to a famous structure that has been seen on a certain textbook.

A. This curvy museum of contemporary art in Bilbao, Spain appears on the cover of the second edition of Stewart's *Calculus: Concepts and Contexts*.

The **Guggenheim** Museum Bilbao

B. This architect designed the Guggenheim museum, along with Walt Disney Concert Hall and the Experience Music Project.

Frank **Gehry**

C. This controversial building in Prague was designed by Gehry and the Czech architect Vlado Milunic. It looks compressed.

The **Dancing House** (accept **Fred and Ginger** or the **Nationale-Nederlanden** building)

17. Mark Twain owned many cats in his lifetime. Answer these questions based on these religiously-based names of his cats.

A. Having written about this character in his final novel, *The Mysterious Stranger*, one cat bore this name of the fallen angel who was the main character of John Milton's *Paradise Lost*.

Satan

B. One cat shared its name with this prince of demons opposed to God based on the name of a Philistine god, Ba'al, and thought to be a translation of "lord of the flies."

Beelzebub

C. Another cat bore the name of this founder of an early monotheistic religion. In Raphael's School of Athens, he is portrayed as holding the celestial sphere.

Zoroaster

18. FTPE, name the animals that these superheroes have based their crime-fighting identities around.

A. The appearance of these creatures of the night are used by an eponymous hero to frighten his enemies.

Bats

B. One group of 4 heroes is collectively known as teenage mutant ninja varieties of these animals.

Turtles

C. One of these common forest animals is the basis for a Marvel superhero that first appeared teaming up with Iron Man to defeat Doctor Doom

Squirrels

19. For ten points each, name these states that replaced the Western Roman Empire.

A. The namesake of this kingdom's Merovingian dynasty fought with Aetius at the Battle of the Catalaunian Plain. It was under the rule of Clovis that its capital was moved to Paris; when the Carolingian kingdom broke up, the kingdoms of France, Germany, and Italy emerged.

Frankish kingdom

B. This kingdom in Aquitaine and later in Spain was founded by a people who, under Alaric, had sacked Rome in 410. It collapsed quickly when invaded by Umayyad forces in 711.

Visigothic kingdom

C. Forces of this kingdom sacked Rome in 455 under Geiseric. Its capital was Carthage, and it was eventually destroyed by an Eastern Roman army commanded by Belisarius.

Vandal kingdom

20. For ten points each, name these dynasties of Persia.

A. This dynasty, which included Cyrus the Great, overthrew the Medes and ruled over a territory stretching from Macedonia to the Indus River.

Achaemenid

B. This dynasty was overthrown and replaced with the modern Islamic Republic of Iran in 1979.

Pahlavi

C. Led by rulers such as Shah Ismail, who lost the battle of Chaldiran to the Ottoman sultan Selim I, and Shah Abbas, who reformed the army and drove back the Ottomans, Uzbeks, and Mughals, this empire eventually fell after Isfahan was taken by the Afghans.

Safavid

21. FTPE, answer these questions about a means of learning.

A. This type of learning is the association of two separate stimuli. A famous example of this is Pavlov's dog.

Classical **Conditioning**

B. This experiment using classical conditioning involved conditioning a namesake child to be scared of fuzzy things including rats, bunnies, and Santa Claus.

Little Albert Experiment

C. This scientist carried out the Little Albert Experiment with his graduate student Rosalie Rayner at Johns Hopkins University.

John Broadus **Watson**