

## RTO 2016

### Round 2

#### Tossups:

1. **In this play, one man is called a socialist for telling a story about a tenant on family land called Shaughnessy. A maid called Cathleen comes in with watered-down whiskey. Later in this play, Doc Hardy's competence is questioned by a character who doesn't trust doctors since one (\*) gave drugs unnecessarily during childbirth. This problem is because of the stinginess of James, the father, who is also reluctant to send his son to a good sanatorium to cure his consumption. Mary is addicted to morphine in, FTP, what play about the Tyrone family written by Eugene O'Neill?**

#### Long Day's Journey into Night

2. **First named by Leibniz, yet most likely first defined by Euler, these entities are uncountable. The Liouville numbers are all these, and there are only a few classes of these since it is difficult to prove a number as this type. These types of numbers can be defined by the fact that they can not be a root of a non-zero polynomial (\*) with rational coefficients. All of these numbers are irrational, but not all irrational numbers are also this type. FTP, Name this type of number, defined as any complex or real number that is not algebraic, the most famous cases being pi and e.**

#### Transcendental numbers

3. **One work by this artist is a set of 82 prints depicting multiple scenes of violence in battle, his *The Disasters of War*. In another work by this artist, a nude woman reclines back against pillows in a green chair. That painting is *La Maja Desnuda*. This artist also painted a giant figure with bulging eyes, (\*) eating a bloody dead body in his depiction of the myth of the Titan Cronos in one of his 14 *Black Paintings*. This particular work was *Saturn Devouring his Son*. He is best known, however, for his work showing several men, particularly one in a white shirt, being held at gunpoint by soldiers, bodies littering the surrounding ground. FTP, name this artist who depicted the resistance against Napoleon's armies during the Peninsular war in his *The Third of May, 1808*.**

Francisco José de Goya y Lucientes

4. **Corals of the Red Sea are said to have been formed by this figure's blood spilling on seaweed, and one of her grandsons had horses stolen by Heracles. She was killed on the orders of Polydectes, and Pegasus and the giant Chrysaor [kri'sore] (\*) sprang from her dead body. She was the sister of Euryale [yeri'uhlee] and Stheno [stheeno], and the daughter of Ceto and Phorcys by most accounts. This figure was slain while pregnant, and was raped by Poseidon in Athena's temple, after which Athena disfigured her face. Her killer was given a helm of invisibility, golden winged sandals, a reflective shield from Athena, and a sword to cut off her head. FTP, name this monstrous figure from Greek mythology, the third of the three Gorgon sisters, best known for having snakes for hair and causing everyone who looked at her to turn into stone.**

#### Medusa

5. **Notes on this piece by the wife of the creator includes the comment "brilliant streak of jade." The artist's wife, Jo, is also the model for one of the red-headed customers. The title of this painting refers to the shape of the nose of one of the patrons. A building with several half-drawn green blinds is in the background(\*). The painting is based on a diner in Greenwich Village. A sign for five-cent Phillies cigars is above the main building and two metal percolators are behind a man in a white uniform. FTP, name this famous work by Edward Hooper which features 3 people in a diner at night.**

### Nighthawks

6. **Microsporidians, metamonads, and archamoebae lack this organelle. Friedreich's ataxia occurs due to dysfunction of proteins in this organelle. Red blood cells, in addition to having no nucleus, also do not contain this organelle. A cyclic reaction that reduces (\*) acetyl-CoA occurs in this organelle; that reaction is called the citric acid cycle. The folds in the inner membrane of this organelle are called cristae, and the space inside the inner membrane of this organelle is called the matrix. For ten points, name this organelle, the powerhouse of the cell.**

### Mitochondria

7. **This country is home to the most expensive building in the world, the Marina Bay Sands resort, as well as a building shaped like two durians. It was claimed for the British East India Company in 1819 by Sir Stamford (\*) Raffles. A battle here during World War Two led to the largest British surrender in history. It was led by Lee Kuan Yew for 31 years, and along with South Korea, Taiwan, and Hong Kong, it is considered one of the Four Asian Tigers. This city-state was kicked out of Malaysia in 1965 due to racial tensions. FTP, name this southeast Asian city-state that lies across the Strait of Johore from Malaysia.**

### Singapore

8. **This constant can be estimated for a given temperature and pressure by a DePriester chart. The temperature differential of the natural log of this constant equals the enthalpy change divided by the ideal gas constant times (\*) the temperature squared. These are calculated as the product of the concentrations of the products over the product of the concentrations of the reactants when the reverse and forward reactions are proceeding at equal rates. Including acid and base dissociation varieties, FTP, name this constant denoted by K.**

### Equilibrium constant

9. **News of this battle was communicated by John Richards Lapenotiere, who arrived at Falmouth on the Pickle. Prior to it, John Pasco suggested to his superior that the word "confides" be changed. The losing side was commanded by Pierre-Charles Villeneuve, while the winning side was commanded by a man who would cry (\*) "Hardy, I do believe they have done it at last... my backbone is shot through" after being shot by a French musketeer. He had earlier signaled "England expects that every man will do his duty" . For 10 points, name this 1805 naval victory which is commemorated by a namesake square in London.**

### Battle of Trafalgar

10. **These particles' interaction with the weak force and neutrons led to their discovery after Supernova 1987A. They were first postulated by Wolfgang Pauli to account for broken conservation laws. A solar problem named for these particles (\*) led to the discovery of multiple flavors of them that they oscillate between. These particles are detected by large chambers such as the Super-Kamiokande observatory and a large bubble chamber in CERN. FTP, name these very small leptons that come in electron, muon, and tau varieties.**

### Neutrinos

11. **Sextus Pompey led the last resistance against Caesar and his heir Octavian from this landmass. The Allied invasion of this landmass was code named Operation Husky. Descendants of Tancred of Hauteville ruled this island from their capital of (\*) Palermo. Alfonso the Fifth unified this landmass with another political entity in 1442. Hannibal's father led that last Carthaginian force on this island during the First Punic War. FTP, name this island which united with Naples to form a namesake kingdom.**

## Sicily

12. **The Deutsch-Jozsa algorithm was the first one to use these devices to deterministically solve a problem faster than classical methods. Using Grover's algorithm, these can search an unsorted database in sub-linear time, and are difficult to make and maintain due to (\*) decoherence.** Shor's Algorithm is expected to run on these devices to factor integers in polynomial time, rendering RSA encryption obsolete, and their namesake objects can be 0, 1, or a superposition of the two. For ten points, identify these computing engines that make use of qubits ("Q-bits").

## quantum computers

13. **In one of his works, the gods discuss the punishment for rape and later Talthybius delivers the body of a dead baby to the queen. In another work by this man, a supposed orphan is reunited with his mother after she recognizes a basket he has. This playwright of *Ion* and (\*) *The Trojan Women* also wrote two plays about a woman nearly sacrificed to allow her father's troops to set sail; those were about Iphigenia. He also wrote a play set in Corinth in which the title character sends a poisoned robe to Glaucus (glou-see) and kills her own children. For 10 points, name this Ancient Greek tragedian of *The Bacchae* and *Medea*.**

## Euripides

14. **This company's name is a portmanteau of its founder's nickname. One of its most famous boots is molded with *Copa Mundial* above the logo, the best selling boot of all time. Poland and Cuba use this company's jersey for their national volleyball teams. By endorsing this company, Andy (\*) Murray became its highest paid individual. This company famously has a rivalry with Puma. It was famously endorsed by Diego Maradona, Zinedine Zidane, and Pele. This company's first piece of clothing was the Franz Beckenbauer tracksuit. This company's headquarters are in Herzogenaurach, Bavaria, Germany. FTP name this second largest global footwear brand company that owns Reebok and Runtastic, whose logo is three parallel bars.**

## Adidas

15. **One disease of this organ, Tetralogy of Fallot, is the most common cause of blue baby syndrome. Its function can also be affected by Brugada syndrome. An infection of this organ can cause Roth's spots and Janeway lesions. Purkinje fibers in this organ help relay signals produced by the (\*) SA and AV nodes. It is surrounded by the pericardium, and the type of tissue that makes up this organ is notably striated. The coronary sulcus separate the atria from the ventricles in this organ. In other organisms it has two or three chambers, while in humans it has four. FTP, name this organ heavily associated with Valentine's Day.**

## the heart

16. **The US's relationship with this country was strained by the accidental bombing of its Belgrade embassy in 1999. "Launching Sputniks" was a term used to refer to goals set during one of this country's economic programs. One leader of this country called another leader of it (\*) "7 parts right and 3 parts wrong. An economic program in this country aimed to surpass Britain in economic output in 15 years. The mouthpiece of the government of this country is the People's Daily. FTP, name this country that is building artificial islands in a namesake sea.**

People's Republic of China (accept Zhongguo)

17. **One technique used for this practice is called packing. California's Proposition 11, passed in 2008, placed the power to perform this practice with an independent commission. In *Davis v. Bandemer*, the Supreme Court said that the (\*) partisan type of this practice violated the Equal Protection**

Clause. The Supreme Court in the cases *Wesberry v. Sanders* and *Baker v. Carr* established the "one man, one vote" principle for this practice. Majority-minority districts, such as NC-12, are created with this practice. For ten points, name this practice of establishing an advantage for a particular group by drawing district boundaries, named after a Massachusetts governor and Vice President of the United States.

### Gerrymandering

18. Adam D'Angelo and Charlie Cheever, both former Facebook employees, founded this website that launched in June of 2009. The few hundred top users on this website are called "Top Writers," and include people like Yishan Wong, former CEO of (\*) Reddit. Unlike Yahoo Answers, people can edit questions and answers on this website, as well as suggest answers to other people. For ten points, name this question-and-answer website whose name is derived from the minimum number of members of a deliberative assembly.

### Quora

19. This novel was first published in the *Russian Messenger* in 1866 in twelve monthly installments. A character in this novel is killed when he is drunk and gets run over by a horse carriage. The main character then gives the widow nearly all his (\*) rubles to pay for Marmeladov's funeral. In this novel, the main character's sister refuses Luzhin's marriage proposal. After the main character fulfills his duty, he doesn't actually take that much of his victim's wealth. Porfiry is suspicious of the delirious main character, who later falls in love with the destitute prostitute, Sonya. For ten points name this novel in which Rodion Raskolnikov murders Alyona Ivanovna by Fyodor Dostoyevsky.

### Crime and Punishment

20. Its name was given to it in 1909 by Jean Baptiste Perrin to memorialize its discoverer. Multiplying this constant by the elementary charge gives (\*) the Faraday Constant. Also known as the Loschmidt constant, it was first measured using coulometry, but is now measured using X-ray crystallography on silicon crystals. Chemists celebrate this number on October 23, specifically at 6:02 am or pm. FTP, name this number, equal to about 6 times 10 to the 23rd, which represents the number of atoms in a mole.

Avogadro's Number or Avogadro's constant or  $6.0221415 \times 10$  to the power of 23 before mention.

21. Also known as Sai ZhenZhu, this author wrote an autobiography about her life as the wife of Absalom Sydenstricker. One character created by this author is enraged when his son brings him stolen meat. This author wrote about (\*) Lotus, the concubine of Wang Lung. Although she is American, this author spent most of her life in China. FTP, name this author of *The House of Earth* trilogy who is most famous for the Pulitzer winning novel, *The Good Earth*.

Pearl S. Buck

## Bonuses Round Two

1. FTPE, name the 19th century U.S. president who had each of the following campaign slogans.

A.  
"54-40 or Fight"

James K. Polk

B. The President's name fills in the blank for the following one: "We Polked you in '44, We shall \*blank\* you in '52"

Franklin Pierce

C. His campaign during wartime was the first to use this slogan: "Don't trade horses in midstream."  
Franklin Delano Roosevelt later copied it in 1944.

Abraham Lincoln

2. FTPE, name these European political parties

A.  
Founded in 1972, the leader of this French party has always been a Le Pen.

National Front (accept FN)

B. This British political party, led by Nigel Farage garnered 13% of the vote in the 2015 general election. It is famous for its opposition to the EU and immigration.

United Kingdom Independence Party (accept UKIP)

C. This Grecian political party defeated New Democracy to obtain a majority in 2014 elections. Its leader is Alexis Tsipras.

Syriza (accept Coalition of the Radical Left)

3. This equation doesn't apply in real life but it makes calculating approximations easy. FTPE,  
A.  
Name this equation of that is a combination of Boyle's, Charles', and Avogadro's Laws. It has an eponymous constant that can be found by multiplying Boltzmann's constant and Avogadro's constant.

Ideal Gas Law

B. This equation is like the Ideal Gas Law except it accounts for deviations from the definition of an ideal gas. It extended upon the Redlich-Kwong equation.

Van der Waals equation of state

C. This man's "equal area rule" or construction corrects the fact that in analytic models, the Van der Waals equation is inaccurate in that it says that pressure can increase with volume in a thermodynamic equilibrium.

James Clerk Maxwell

4. Answer these questions about works written in Persian. FTPE,  
A.

This massive Persian dictionary is composed of 16 volumes for a total of about 27,000 pages. Despite its size, it still doesn't have all the words because of scientific words that have been added more recently and other words that the lexicographer just straight up forgot so he didn't put it in originally. For this reason, it is still being edited to this day.

### **Dehkoda Dictionary**

B. This collection tells the story of the Sassanid queen Scheherazade and the malevolent King Shahryar (pronounced "shah-ree-are").

### **One Thousand and One Nights or Arabian Nights**

C. The Shanameh consists of about 60,000 verses written by Ferdowsi and is the national epic of this country. Parts of the beginnings talk about Zoroastrianism

The Islamic Republic of **Iran**

5. FTPE, Name some letters from the Greek Alphabet given their mathematical uses.

A.

The lower-case version of this letter denotes the divisor function in number theory, while the capital version is used in summation notation.

### **Sigma**

B. This Greek letter, also known as Archimedes' Constant when it is lower-case, is used as notation for the products of a sequence of numbers, similar to a factorial, in its capital form.

### **Pi**

C. The letter is most commonly used in mathematics to denote a small positive quantity, such as for the arbitrary difference left over as a limit is taken, or the absolute value of an error.

### **Epsilon**

6. FTPE, name these American women's rights activists.

A.

This woman wrote *The Woman's Bible* and *Eighty Years and More*. She fought for women's suffrage in the antebellum period and also an abolitionist with her husband Henry Brewster.

Elizabeth Cady **Stanton**

B. Stanton worked with this woman to write the Declaration of Sentiments at the Seneca Falls Convention in 1848. She also helped found the Philadelphia Female Anti-Slavery Society.

Lucretia **Mott**

C. This New York State agent of the American Anti-Slavery Society was a lifelong friend to Elizabeth Cady Stanton. She was a pivotal part of the women's suffrage movement and got her face on the one dollar coin.

Susan B. **Anthony**

7. FTPE, given the civilization, give the name of their underworld.

A.

Norse

**Hel**

B. Chinese

**Divu**

C. Maya

**Xibalba**

8. FTPE, name these gods missing parts of their bodies.

A.

This falcon-headed Egyptian god lost his eye in a battle against his evil uncle Set.

**Horus**

B. Fenrir bit off the hand of this Norse god of war when the Aesir bound Fenrir with magic ribbon.

**Tyr**("Tear")

C. After being reconstructed by his sister/wife Isis, this god of the dead had his missing phallus replaced by a golden imitation.

**Osiris**

9. FTPE, name this things related to power.

A.

This man sang "Power." He is most notable for his huge ego and marriage to Kim Kardashian.

Kanye **West**

B. This device, created by Nintendo, was criticized for its hard-to-use and imprecise controls. Because of the decision to make it an alternative controller for the NES, it was unsuccessful.

**Power Glove**

C. In the latest installment of the Fallout series, the player is given this and a minigun to help protect the Minutemen and clear the Commonwealth of raiders.

**Power armor**

10. A strip of paper with a twist can have some interesting properties. FTPE,

A.

Name this one-sided surface that can be created from a single strip of paper.

**Mobius strip**

B. Cutting a mobius strip in half will generate two of these objects that are linked.

**Circle** (accept "loop" or other obvious equivalencies)

C. Cutting this object in half creates two Mobius strips with opposite chirality.

**Klein bottle**

11. FTPE, name these questions about the Pluto flyby.

A.

This probe made the encounter with Pluto. It is estimated it will take 16 months of all the data to be transmitted to Earth.

New Horizons

B. This object is the largest moon of Pluto after Charon: although larger than Nix, the images taken are of lower detail.

Hydra

C. One region of Charon with features such as Kupric Mons and the Sulu Crater is named for this television series.

### Star Trek

12. For ten points each, name these scientists who were wrong.

A.

Dead center in the fresco, *The School of Athens* by Raphael, this man prevented the theory of atoms for about two thousand years.

Aristotle

B. In a series of debates with Bohr, he believed the Heisenberg uncertainty principle to be incorrect because of its randomness. The famous quote from him in these debates is "God does not play dice with the world."

Albert Einstein

C. The forerunner of evolution, he believed in the inheritance of acquired traits. Notably, he also believed that a creature could acquire traits during their lifetime.

Jean-Baptiste Lamarck

13. FTPE, answer these questions about an anthropologist's legacy.

A.

This man has been called the father of American Anthropology. He wrote *The Mind of Primitive Man* and coined the term "cultural relativism."

Franz Uri Boas

B. This student of Boas wrote *The Chrysanthemum and the Sword* about Japan during World War 2. She was unable to actually travel there but analyzed the culture based on tangible results.

Ruth Benedict

C. This other student of Boas went on to form a namesake hypothesis with Benjamin Lee Whorf, which says that language determines thought.

Edward Sapir

14. For ten points each answer some questions on 20th century short stories where people get murdered.



A.

This short story, first published in 1930 by William Faulkner, is a tragedy of the titular woman, who kills her lover to be with him forever.

A **Rose for Emily**

B. In this short story by Tobias Wolff, Tub shoots Kenny and then the titular characters collectively fail at taking him to a hospital.

**Hunters in the Snow**

C. This short story, published in a collection of the same title by Flannery O'Connor, depicts Bailey's family murder by the Misfit on their way to Florida. Red Sammy Butts says the title of this short story in his restaurant, the Tower.

A **Good Man is Hard to Find**

15. Functions of this type of number are sometimes described by Cauchy's Theorem and the Cauchy-Riemann equations. For 10 points each:

A.

Identify this type of number composed of real and imaginary parts.

**Complex Numbers**

B. If a complex number is multiplied by this entity, the product is a real number.

**Complex Conjugate**

C. Complex numbers can be written in polar form as  $r$  times  $e$  to a certain power using this formula, which states that  $e$  to the  $i$  theta equals cosine theta plus  $i$  sine theta.

**Euler's Formula**

16. The protagonist's final monologue has been speculated to be a farewell address by the playwright to his audience. FTPE,

A.

Name this 1611 Shakespeare play that begins with a storm at sea. The magician Prospero, with aid from the spirit Ariel, marries his daughter Miranda to Ferdinand.

The **Tempest**

B. This child of Sycorax hides under a cloak while fetching firewood for his master, mistaking a jester for a spirit sent by his master to torment him.

**Caliban**

C. King Alonso of this city helped Antonio usurp Prospero of his dukedom of Milan.

**Naples**

17. FTPE, complete the following quotations by poet Alfred, Lord Tennyson.

A.

Tis better to have loved than lost / Than never to have loved

**At all**

B. Into the valley of death / Rode the

**Six hundred**

C. Long fields of barley and of rye / That clothe the world and meet

The **sky**

18. For ten points each, answer these questions about the Bush family.

A.

This 43rd Governor of Florida is known for his wealthy super PAC, Right to Rise.

**Jeb** Bush

B. George H.W. Bush first (and successfully) ran for president in this year, succeeding Ronald Reagan and defeating Michael Dukakis.

**1988**

C. This father of Bush 41 was both a US Senator and a banker on Wall Street. He served as treasurer of the first national campaign of Planned Parenthood in 1947.

**Prescott** Bush

19. FTPE, name these countries with interesting flags

A.

This country is the only one other than Vatican City that has a square flag.

**Switzerland**

B. This country's flag was green, and only green from 1977-2011.

**Libya**

C. This country's flag is the only non-quadrilateral flag. It is made of two red triangles.

**Nepal**

20. Much of our understanding about space comes from the light emitted from or reflected by objects. FTPE, answer these questions about a recently confirmed method of detecting distant events.

A.

In February 2016, LIGO Scientific and Virgo announced the detection of these waves, which cause the compression and stretching of spacetime.

**Gravitational** waves (ripples)

B. The waves are believed to have originated from this event, believed to have happened over a billion years ago.

The **collision of two black holes**

C. The current detectors are ground based systems of lasers. Plans for space based detectors are in the works. These consist of three 1 million km arms, a massive improvement over the current LIGO system that has 4km arms. The pathfinder mission of one was launched late in 2015. Name either the Japanese or the European and American proposal.

(e)**LISA** or **DECIGO**

21. FTPE name these colleges who have placed high in the Capital One Cup.

A.

This college had the women champion in the 2014- 2015 school years. Name this college in California with mascot Cardinal.

**Stanford** University

B. This college placed second in the cup for the men's side in the 2010-2011 school years. Name this college which was founded by Thomas Jefferson.

University of **Virginia** (Don't accept or prompt on Virginia Tech)

C. This college placed third in the cup for the men's side in the 2012-2013 school years. Name this college which was home to coach Chip Kelly and quarterback Marcus Mariota.

University of **Oregon**