

LIMIT 2015: A Limit to Learning is a Dangerous Thing

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Packet 6

Tossups

1) In this play, three baseball players tease a character before they are shooed off the stage, and a church choir sings “Blessed Be the Tie that Binds.” That choir in this play is directed by the alcoholic Simon Stimson, who later hangs himself, and a character asks if people (*) “realize life while they live it” while revisiting her twelfth birthday in the third act of this play. That character, Emily Webb, dies in childbirth after marrying George Gibbs. For 10 points, name this play narrated by the Stage Manager and set in Grover’s Corners, New Hampshire, a work by Thornton Wilder.

ANSWER: Our Town <CC>

2) The Harmonic Addition Theorem creates equations in the form of the derivative of this function. The *Almagest* features a table of chords generated using this function. This function, in its hyperbolic form, is equal to e to the x minus e to the negative x all over 2. This function is used to convert the (*) y-component of a vector in polar space to a rectangular component. In a triangle, this function of an angle over the side opposite to it is constant for any angle chosen. Its derivative is cosine and its reciprocal is cosecant. For 10 points, name this odd trigonometric function that is the y-value of a point on the unit circle.

ANSWER: sine <HW>

3) Kroomen were Liberians recruited to this nation’s West Africa or ‘preventative’ squadron. This country’s military suffered a major defeat at Cartagena in a war which began when Spanish ‘guarda costas’ attacked its ships. This nation’s fleet shipped one good to ‘fast crabs’ and ‘scrambling dragons’. This nation’s navy won a war that ended both the quarantine of its merchants in 13 “factories” and the (*) Canton system. Michiel de Ruyter damaged this nation’s main naval base at Chatham, although others at Plymouth and Portsmouth survived that raid on the Medway. For 10 points, name this nation that won at Trafalgar with its Royal Navy.

ANSWER: Great Britain or United Kingdom or UK; prompt on “England”

4) A set of works for this instrument dedicated “to all artists” each individually feature different techniques to be practiced. That collection, whose pieces are all in the form of etudes, includes sections called “The Hunt” and “Devil’s Laughter.” Beethoven originally dedicated one work for this instrument without a designated key to George Bridgetower, his (*) *Kreutzer Sonata*. Vivaldi composed twelve concerti for this instrument called *The Contest Between Harmony and Invention*, which includes *The Four Seasons*. For 10 points, name this string instrument that Paganini wrote 24 caprices for which is pitched higher than the viola.

ANSWER: violin or fiddle <DS>

5) One experiment uses the Waltenhofen type of this device to make eddy currents. Huygens [*HI*-gens] built one of these isochronous devices, which have conical and torsion types, with a part that traced a cycloid. They are not springs, but they do have a restoring torque. When they’re extended objects, they are called compound or physical. Their period is the square root of their (*) effective length over g for simple types. These cantilevered objects have bobs and obey the small-angle approximation. Grandfather clocks are based on these simple harmonic oscillators, which Foucault made. For 10 points, name these swinging devices with one fixed end.

ANSWER: pendulums or pendula

6) The poet, critic, and author of the essay collection *Cultural Amnesia*, Clive James, is from this country. Another author from here wrote about the painter Hurlst Duffield, and another novel by an author from this nation concerns a bet between the title characters about a glass church being transported overland by Palm Sunday. *The Vivisector* and (*) *Oscar and Lucinda* were both written by authors from this country, which also produced the author of *Schindler's Ark*, Thomas Keneally. For 10 points, name this country home to the author of *Voss*, Patrick White, as well as Peter Carey, who wrote about folk hero Ned Kelly and his Aboriginal trackers.
ANSWER: Australia <JG>

7) The 1951 Stresa Convention set geographic indications for this food. Halloumi is one type of this food made only in Cyprus. One type of this food has created a tourist industry around “Comté routes” in the Jura range. Another type “of kings and popes” is infected with a *Penicillium* strain in caves in southeastern (*) France. Triple and double-crème describe the butterfat content of this food. One of them has blue veins and is called Roquefort. These foods can be stretched or washed after they are curdled. For 10 points, name these foods, which include Brie, Cheddar, and Swiss types.
ANSWER: cheeses; accept cottage cheese and prompt on “dairy”

8) Members of the “T–K” link led the May 16 coup in this city and passed a Law for National Reconstruction. The *Weizhi* described a journey from what is now this city to Japan. Gorbachev’s 1986 Vladivostok speech warned against a militarized triangle of Washington, Tokyo, and this city. In 1592, slaves revolted in this city, helping (*) Toyotomi Hideyoshi capture it. Ishong Sansong was a fortress near what is now this city, before it was called Hanyang during the Joseon Dynasty. This city on the Han River was heavily damaged in the Battle of Incheon during the Korean War. For 10 points, name this South Korean capital.
ANSWER: Seoul

9) Andrea del Castagno’s version of this scene has a detailed depiction of marble walls and an early use of “deceive the eye” technique. In another version of this scene, two German soldiers are to the right holding Halberds, while to the left, a dwarf holding a parrot is accosted by a boy in pink; that work was (*) retitled *Feast in the House of Levi* by its artist, Paolo Veronese. Tintoretto’s version of this scene focuses on a woman kneeling next to a basket by placing the central table on a diagonal axis. One version of this scene sets it just after the Apostles have been told one of them will betray Christ. For 10 points, name this scene from the Book of John famously painted by Leonardo da Vinci.
ANSWER: the Last Supper <JG>

10) In the outer-sphere mechanism, one electron is transferred among ions of these materials, whose coordination spheres meet at their edges. The spectrochemical series lists ligands’ abilities to coordinate with these materials. Interstitial compounds are lattices of these materials with small atoms in between. Cyanidation extracts some of these materials, and (*) chelates [*KEE*-lates] have these ions in their center. Leaching and electrowinning extract these materials, which are deposited by electroplating. A stepwise diagonal line splits these elements and metalloids on the periodic table. For 10 points, name these materials with a “transition” type.
ANSWER: metals

11) Sites for performing this action in Zoroastrianism are given the suffix *pir*. People performing one form of this action are required to wear two sheets of cloth called the *ihram*. The largest one of these is named for a pot of nectar created from the churning of the ocean of milk; that is the Hindu Kumbh Mela. Three pillars called the *jamarat* are (*) pelted with stones by people performing this action, during which participants pray on Mount Arafat and around the *Kaaba*. For 10 points, name this religious rite, known in Islam as the *hajj*.
ANSWER: pilgrimages; do not accept or prompt on **Hajj**

12) In one song from this musical, a character sings “They went an' built a skyscraper seven stories high/ About as high as a buildin' orta grow” after returning from Kansas City. The Persian peddler Hakim Ali has to stop Will Parker from spending the \$50 he needs to marry (*) Ado Annie in this musical, which climaxes with Jud trying to kill one character before falling on his knife. At the start of this musical, Curly promises to rent a “Surry with the Fringe on Top” to take Laurey to the box social after he had earlier sung “Oh, What a Beautiful Mornin’”. For 10 points, name this Rodgers and Hammerstein musical set in a Western state just before statehood.
ANSWER: Oklahoma! <JG>

13) Nid-hogg was born near one of these places called Nioafjöll [Ni-a-fol]. Zipacna boasted to be the creator of these objects, but was later killed by the Hero Twins with one of these objects. One of these places was guarded by the Seasons, and past its gates there were seven steps painted with the colors of the rainbow. A purple ram’s fleece was used for creating rain on one of these. (*) Hanuman moved one of these to create a bridge between two areas. It was on one of these features that Laius pierced and tethered Oedipus’s ankles together to prevent a prophecy. For 10 points, name these geographic features like the Muses’ home of Parnassus.
ANSWER: mountains <KD>

14) After this character’s death, a lock of hair is cut from her, leaving a bald patch, and she is buried in three coffins. After giving birth to Berthe, this character's only interest in her is in the ribbons and lace for her clothes. This character learns of the end of her relationship to one man from a letter in a basket of (*) apricots, but is happy after seeing the play *Lucia di Lammermoor*, where she meets the lawyer Leon Dupuis and begins an affair. After Dupuis and Rodolphe Boulanger refuse to help her pay her debts, this woman drinks arsenic. For 10 points, name this adulterous wife of the doctor Charles, the title character of a novel by Gustave Flaubert.
ANSWER: Emma Bovary; accept either underlined name; also accept Madame Bovary <JG>

15) The Oneida Community, founded by John Humphrey Noyes, made traps out of this substance. The 1892 Homestead Strike was at a plant making this good. Henry Ford first used this product mixed with vanadium in the US. A, B, C, and D ships were the first made mostly of this material in the US Navy. One riot over this product saw the AA defeated by Governor Pattison and (*) the Pinkertons. To create a “National” corporation of this good, banker J.P. Morgan and Charles M. Schwab merged Carnegie’s corporation of it with others. The Bessemer process sped up the production of this alloy. For 10 points, name this alloy of charcoal and iron.
ANSWER: steel; do not accept iron <AS>

16) This man holds the record for most wishes granted in Make-A-Wish history. He plays Steven, a character with an ambiguous sexuality, who has sex with Amy Schumer’s character in the film *Trainwreck*. This man is said to be participating in a “spit-swapping make-out match” and a “steel cage Chutes and Ladders match,” and is a (*) “former decorated member of the United States Marine Corps,” according to one source. This man will answer the question “Who is champ?” this Sunday night at WWE Super Slam. For 10 points, name this professional wrestler, the subject of an infamous prank call.
ANSWER: John Felix Anthony Cena <CC>

17) A class of these organisms may go through a reproductive stage known as the teleomorph, while infections that are induced by these organisms can be treated with compounds such as Amphotericin B. CATs are structures formed from the conidia of some of these organisms and are a form of (*) branching cells known as hyphae. Those hyphae band together to form mycelia within these organisms, which also colonize plant roots as part of symbiotic mycorrhizae. These organisms’ kingdom contains phyla such as Ascomycota and Zygomycota. For 10 points, name this kingdom of organisms including yeast.
ANSWER: Fungi <AB>

18) **One Roman Catholic Archbishop in this country ruled non-Muslims could not say “Allah” in 2009, but that was overturned in 2013. This country’s national investment fund 1-MDB is the center of a scandal in which its Prime Minister received \$700 million since 2013. This country was the site of the Low Yat riots against its (*) Chinese minority. Najib Rizak of the UMNO strengthened the Sedition Act in this nation. Some Congressmen petitioned John Kerry not to upgrade this country on the Trafficking in Persons list. For 10 points, name this Southeast Asian country from where Flight 370 disappeared into the Indian Ocean.**

ANSWER: Malaysian Federation

19) **One character in this novel closes a window on the arm of an intruding ghost. In this novel, one character tells another about the Fairy Cave at Peni-stone Crag, while at the end of this novel, the narrator replaces the housekeeper Zillah. One character in this novel is adopted on a trip to Liverpool, and that character rents a house out to Mr. (*) Lockwood. In this novel, Hindley locks that character in the attic, and he later fathers a son named Linton with Isabella. The action of this novel takes place at Thrush-cross Grange and the title farmhouse. For 10 points, name this novel about the love between Heathcliff and Catherine, written by Emily Bronte.**

ANSWER: Wuthering Heights <CC>

20) **This nation’s government claimed one-fifth of all precious metals mined in its empire. One man from this country wrote the *General History of the Indies*. This country created intendancies in four viceroyalties to govern its empire. Its 1542 New Laws were unenforced. The Valladolid debates about this empire’s Indians were between (*) Juan de Sepulveda and Bartholomew de Las Casas. Bernal Diaz accompanied Hernando Cortes to write a history of the “New” version of this country, which included Mexico. For 10 points, name this country whose conquistadors defeated the Aztecs and Incas.**

ANSWER: Kingdom of Spain or Spanish Empire

Bonuses

1) This concept is one of the three jewels of Buddhism along with the Buddha and the *sangha*. For 10 points each:

[10] Name this principle of “duty” common in many South Asian religions. It is often represented by the *chakra*, an eight-spoked wheel.

ANSWER: **dharma**

[10] Dharma is the first of the four stages of life in Hinduism, while Sannyasa, the last one, emphasizes detachment and renunciation, or this concept. This concept also refers to a lack of pleasure.

ANSWER: **asceticism**

[10] During Sannyasa, individuals who have attained *moksha* will be enlightened and free from this never-ending process, which is affected by a person’s karma and ends with people becoming animals.

ANSWER: **reincarnation** or **punarjanma**; accept word forms and synonyms like being **born again** <CC>

2) Identify some things about Classical sculpture, for 10 points each:

[10] Thought to be the work of Alexandros of Antioch, this depiction of the title goddess of beauty is famously missing its arms.

ANSWER: **Venus de Milo** or **Aphrodite of Milos**

[10] The Venus de Milo was once mistakenly believed to have been created by this Athenian sculptor of *Hermes with the Infant Dionysus* and *Aphrodite of Cnidus*.

ANSWER: **Praxiteles**

[10] In 1999, residents of this Greek island began a letter-writing campaign aimed at the return of a sculpture known as the “Winged Victory” of this place.

ANSWER: **Samothrace** <JG>

3) This play is set on “an English evening” as Mr. Smith, an Englishman, sits in his “English armchair and English slippers,” smoking “an English pipe and reading an English newspaper.” For 10 points each:

[10] Name this play in which The Fire Chief interrupts an evening between the Smiths and Martins, whose conversations slowly become more and more incomprehensible before the play starts all over again.

ANSWER: *The* **Bald Soprano**

[10] The Bald Soprano was written by this Romanian-French playwright of *The Rhinoceros* and *The Chairs*.

ANSWER: Eugene **Ionesco**

[10] Ionesco was at the forefront of this movement in drama that expressed the meaninglessness of life. Writers who were associated with this genre include Harold Pinter, Edward Albee and Vaclav Havel.

ANSWER: **“Theatre of the Absurd”** <JG>

4) This common-law constitution contained 11 laws and was modelled on the Massachusetts Bay Colony’s charter. For 10 points each:

[10] Name this 1638 state constitution written by Roger Ludlow, which established a self-governing colony around Windsor, Wethersfield, and a modern-day state’s capital.

ANSWER: **Fundamental Orders**

[10] At the time of the Fundamental Orders, the British colonies in the Americas were either royal colonies or this type of colony, whose names imply that they are created for the welfare of their denizens.

ANSWER: **commonwealths**

[10] The Fundamental Orders became the constitution of this state that is home to Yale and has capital Hartford. Thomas Hooker and John Davenport lived here.

ANSWER: **Connecticut** <AS>

5) Answer some questions about literature of the English Restoration. For 10 points each:

[10] This author wrote about the marriage of Leonidas to Palmyra in his comedy *Marriage a la Mode*. He also satirized the political situation of the time in the Biblical allegory *Absalom and Achitophel* and attacked Thomas Shadwell in his *Mac Flecknoe*.

ANSWER: John Dryden

[10] This author of the comedy *The Rover* wrote a novel about a “royal slave” in Suriname entitled *Oronooko*. She was the first woman to write plays professionally.

ANSWER: Aphra Behn

[10] Though this author of *Samson Agonistes* was active during the Restoration, he continued to write in support of Oliver Cromwell and the Commonwealth. He is best known for his epic poem *Paradise Lost*.

ANSWER: John Milton <CC>

6) This man’s lawyer decided to file to dismiss a case involving banking violations after information was supposedly leaked by the government. For 10 points each:

[10] Name this former US Speaker of the House who was indicted for those cash withdrawals which he was using to cover up improper conduct.

ANSWER: John Dennis Hastert

[10] Hastert was from this state known for corrupt officials like Rod Blagojevich, a former governor who tried to sell President Obama’s Senate seat when he was elected President in 2008.

ANSWER: Illinois

[10] As Speaker of the House, Dennis Hastert opposed the Bipartisan Campaign Finance Act, which was sponsored by Russ Feingold and this man. This man was on the *USS Forrestal* when it caught on fire.

ANSWER: John McCain <AS>

7) Poynting’s theorem multiplies the electric field-squared by this constant. For 10 points each:

[10] Name this constant denoted epsilon-nought in no medium. The electric susceptibility is equal to [quantity] *this constant minus 1* [end-quantity] over 4-pi.

ANSWER: permittivity of free space or vacuum permittivity or electric constant; prompt on “permittivity”

[10] This constant, abbreviated c, is defined as the vacuum permittivity multiplied by the vacuum permeability to the negative one-half power. It’s approximately 30 million meters per second.

ANSWER: speed of light

[10] Light slows down in these media, which reduce the electric field going through them. These materials can “breakdown”, and their permittivity is the permittivity of free space multiplied by the relative permittivity.

ANSWER: dielectrics

8) This team won the 1991 World Series behind a 10-inning shutout from Jack Morris in Game 7. For 10 points each:

[10] Name this baseball team, who moved to Target Field from the Hubert H. Humphrey Metrodome in 2010.

ANSWER: Minnesota Twins; accept either or both

[10] The Twins moved to Minnesota from this city. The present MLB team here used back-to-back first overall draft picks to select Stephen Strasburg and Bryce Harper in 2009 and 2010.

ANSWER: Washington, D.C. or Washington Nationals

[10] The Nationals signed this former Detroit Tigers pitcher as a free agent before the 2015 season. He won the American League Cy Young Award in 2013, and he has one brown and one blue eye.

ANSWER: Max Scherzer <CC>

9) Baade and Zwicky proposed these events and their associated cosmic rays, which can create Dense Cool Clouds in the interstellar medium. For 10 points each:

[10] Name these high-energy events that occur when stars with 1.44 or more times the mass of the Sun, called the Chandrasekhar limit, explode.

ANSWER: supernovae

[10] Stars undergoing supernovae break this condition, the balance of gravity with outward pressure generated from fusion. The Sun and other “living” stars are in this state.

ANSWER: hydrostatic or gravitational equilibrium; prompt on “equilibrium” and say “What type?”

[10] Stars in hydrostatic equilibrium show up on this group of “living” stars, which is a diagonal line on Hertzsprung-Russell diagrams.

ANSWER: Main Sequence or MS

10) William Strickland built this institution in a Greek Revival style for its President, Nicholas Biddle. For 10 points each:

[10] Name this national institution that was destroyed by the Distribution Act of 1836, which forced currency to be only gold and silver.

ANSWER: Second Bank of the United States

[10] The Distribution Act redistributed federal surplus to these pejoratively-named banks based on their surplus acquisition on spoils. Their preference for paper money led to the Specie Circular.

ANSWER: ‘pet banks’

[10] The Distribution Act and the proliferation of pet banks were during the presidency of this man. He claimed that the election of 1824 was a “Corrupt Bargain”, and he appears on the \$20 bill.

ANSWER: Andrew Jackson <AS>

11) This was the first protein sequenced by Sanger sequencing, and is a pancreatic hormone. For 10 points each:

[10] Name this hormone that lowers blood glucose secreted by beta-cells, that is opposed by glucagon. Its presence was initially measured by radioimmunoassay.

ANSWER: insulin

[10] This process in the liver and kidney converts pyruvate into glucose-6-phosphate. It’s basically the opposite of glycolysis and part of it is inhibited by insulin.

ANSWER: gluconeogenesis

[10] The malate-aspartate shuttle that feeds oxaloacetate to gluconeogenesis occurs through the inner membrane of this organelle, which also creates and stores acetyl-CoA.

ANSWER: mitochondrion or mitochondria

12) In a novel by this author, the protagonist defeats Spitz in a fight to the death. For 10 points each:

[10] Name this author who described Buck’s sale to the inept Hal, Charles, and Mercedes in his novel *The Call of the Wild*.

ANSWER: (John Griffith) Jack London or John Griffith Chaney

[10] In Jack London’s *The Call of the Wild*, Buck’s final owner is this man, who saves him from Hal, Charles, and Mercedes but is later killed by Yeehat natives.

ANSWER: John Thornton; accept either underlined name

[10] This dystopian novel by London takes the form of a discovered manuscript written by Avis Everhard, chronicling the rise of the Oligarchy in the U.S. and Everhard’s role in the First Revolt against it.

ANSWER: *The Iron Heel*

13) One of the three figures illuminated via the use of chiaroscuro in this paintings is a young girl in a yellow dress with a dead chicken attached to her belt. For 10 points each:

[10] Name this painting, which shows a man who wears a red sash and stands in the center next to a man dressed bright yellow.

ANSWER: *The Night Watch*

[10] *The Night Watch* was painted by this artist of the Dutch Golden Age. He also depicted the dissection of a man's arm in *The Anatomy Lesson of Dr. Nicholas Tulp*.

ANSWER: Rembrandt (Harmenszoon) van Rijn; accept either underlined answer

[10] Rembrandt again used chiaroscuro to great effect in this painting, in which one figure sits in darkness as a great illuminated wave rocks the front end of a small boat.

ANSWER: *The Storm on the Sea of Galilee* <JG>

14) Bossuet described royal rule as sacred, paternal, reasonable, and absolute, which this man took to heart. For 10 points each:

[10] Name this man who fled Paris during the Fronde and later became the “Sun King”, ending Anne's regency.

ANSWER: Louis XIV

[10] The Fronde began with the “robe” group of this social class, which also had a “sword” group. These people comprised the Second Estate.

ANSWER: nobility or nobles

[10] These French high courts were controlled by the nobility and opposed attempts to raise taxes after the Seven Years' War. They called themselves “the custodian and the depository”, and Maupeou tried to fight them.

ANSWER: parlements

15) For 10 points each, answer the following about the Norse god Baldr:

[10] Baldr was killed due to the machinations of this Norse trickster god. For his scheming, this god was punished by being chained to a rock underneath dripping venom.

ANSWER: Loki

[10] After Baldr's death, this son of Odin volunteered to go to Hel to bring Baldr back from the underworld. Hel told this god that she would release Baldr if every single thing in the world wept for Baldr's death.

ANSWER: Hermod

[10] Hermod rode this eight-legged horse on his journey to Hel. Loki gave birth to this creature after turning into a mare and procreating with Svadilfari [Svad-eel-fah-ree].

ANSWER: Sleipnir

16) In this novel, Chao Gai is hit by a poisoned arrow in a battle against the Zeng family, leaving either Lu Junyi or Song Jiang had to replace him. For 10 points each:

[10] Name this story about a group of bandits living in a certain swampy location.

ANSWER: Outlaws of the Marsh or The Water Margin, Shuihu Zhuan, All Men are Brothers

[10] The author of *Outlaws of the Marsh*, Shi Nai'an, lived during the Ming Dynasty in this country.

ANSWER: China

[10] This strong guy in *Water Margin* became a county constable after bashing in the Jingyang Ridge tiger's skull with his bare hands.

ANSWER: Wu Song; accept Pilgrim; prompt on partial answer <HW>

17) In 2012, the Council of Europe proposed Russian as a regional language of this nation, while low disposable incomes and closing childcare facilities reduced its fertility rates decades before. For 10 points each:

[10] Name this country whose large Russian minority spreads from Crimea to its capital, Kiev. It suffers from a pronounced HIV/AIDS crisis.

ANSWER: **Ukraine**

[10] Eastern Ukraine and many other Commonwealth of Independent States nations have been suffering from this general demographic trend, which is not income inequality but is represented by the “scissors” gap.

ANSWER: **negative** population **growth** or a **reduced** population or a **decreasing** **population**; accept word forms and synonyms

[10] This evangelical Protestant faith that focuses on baptisms predominates in Western Ukraine and was targeted by Khrushchev. Most of its Ukrainian adherents are blue-collar workers.

ANSWER: **Pentecostalism**

18) One adage stated that this city “shined on the Sun”, and the Tang dynasty introduced silkworms to the Ferghana valley it was located in. For 10 points each:

[10] Name this Samanid city in what is now Uzbekistan, which Firdausi and Avicenna were from, and which Genghis Khan sacked in 1220.

ANSWER: **Bukhara**

[10] This Turko-Mongol leader, called the “Sword of Islam”, was from the Barlas tribe and was saved by a Bukharan doctor. He chose Samarkand as his capital and sacked Delhi in the 1300s.

ANSWER: **Tamerlane** or **Timur** the **Lame** or **Tamburlaine** or **Timur-i Leng** or **Timur Lenk**

[10] Timur tried to defeat these people, who established the system of giving merit-based exams to applicants to the civil service. Genghis Khan had earlier disestablished those civil service exams when he conquered these people.

ANSWER: **Chinese**

19) This composer’s opera *Treemonisha* won a Pulitzer after its first complete staging in 1972, 55 years after this man’s death. For 10 points each:

[10] Name this African-American composer of “The Entertainer.”

ANSWER: Scott **Joplin**

[10] Scott Joplin was known as the “King” of writing this genre of music popular at the turn of the 20th century. It is characterized by syncopated rhythms and may have been invented in St. Louis.

ANSWER: **ragtime** or **rag-time**

[10] One of Joplin’s earliest compositions was this A-flat-major piano work named after a club in Sedalia, Missouri.

ANSWER: **Maple Leaf Rag** <JG>

20) The “zero-point” version of this quantity is irremovable. For 10 points each:

[10] Name this quantized quantity that changes when a molecule emits a photon in a spectroscopic transition.

ANSWER: **energy**

[10] These numbers, which have principal, azimuthal, magnetic, and spin types abbreviated n, l, m, and s, describe the energy and the wavefunction of a quantum system.

ANSWER: **quantum numbers**

[10] This thought experiment uses the Schrodinger equation and has a particle in a potential well that can move in one dimension. It’s used to find energy levels via quantum numbers of that particle.

ANSWER: **particle-in-a-box**