



1. The discoverer of these functions is John Napier. This function of a root of x is equal to this function of x divided by the order of the root. Without a horizontal shift, these functions all possess a vertical asymptote at x equals zero. This function of a quotient is equal to this function of the numerator minus this function of the denominator. e is the base of the "natural" one of these functions, written as $\ln(L N)$. Ones that do not specify a base are assumed to be base 10. For 10 points, name these functions which can be thought of as reverse exponents.

ANSWER: **logarithms**

020-12-70-13101

2. This character is an old man known as "the trapper" in *The Prairie*. He aids Judge Marmaduke Temple and is known as Hawkeye in *The Pioneers*. In another novel, this character helps the Munro sisters get to Fort William Henry and befriends Chingachgook and the Mohawk warrior Uncas. He is the protagonist of *The Deerslayer*, *The Pathfinder*, and *The Last of the Mohicans*. For 10 points, name this character created by James Fenimore Cooper.

ANSWER: **Natty Bumppo** [or Natty **Bumppo**; or **Nathaniel** Bumppo; or **Hawkeye** before it is read]

015-12-70-13102

3. Former New Jersey governor Thomas Kean chaired an investigation into this event. One operation during this event ended after Larry Silverstein's command "pull it." Richard Drew captured the upside-down "falling man" in a photograph during this incident, which is memorialized in Shanksville, Pennsylvania, near the site of 44 deaths. For 10 points, name this day on which Flight 93 was rerouted, but plane hijackers destroyed New York's Twin Towers.

ANSWER: **9/11** terrorist attacks [or **September 11th**, 2001; or the destruction of the **World Trade Center**; or the fall of the **Twin Towers**; prompt on **Flight 93**]

104-12-70-13103

4. One of this artist's paintings features a woman falling from a building through the clouds as well as her bloody corpse on the ground. Besides depicting the *Suicide of Dorothy Hale*, this artist depicted a woman with thorns around her neck and a monkey on her left shoulder. In another work, this painter featured two identical women with exposed hearts, with one woman holding a bloody pair of scissors. For 10 points, name this female Mexican painter and wife of Diego Rivera, who painted many bizarre self-portraits.

ANSWER: Frida **Kahlo** de Rivera [or Magdalena Carmen Frieda **Kahlo** y Calderon]

052-12-70-13104

5. In this work, the ship *Demeter* come into harbor with no one but the dead captain on board, and children are attacked by the "Bloofer Lady." One character in this work, Dr. Seward, runs an insane asylum, which houses Renfield, and he proposes marriage to Lucy Westenra. This novel opens with Jonathan Harker, fiancée of Mina Murray, traveling through the Carpathian Mountains to the home of the title character. For 10 points, name this vampire novel by Bram Stoker.

ANSWER: **Dracula**

191-12-70-13105

6. A hormone secreted from this organ is responsible for triggering the formation of red blood cells; that hormone is erythropoietin. This organ contains balls of capillaries surrounded slit diaphragms and podocytes, which are responsible for keeping proteins from leaking out of the circulation. The functional unit of this organ contains a pair of convoluted tubules book-ending the Loop of Henle, and is called the nephron. This organ is responsible for maintaining salt balance. For 10 points, name this organ which produces urine.

ANSWER: **kidney**

048-12-70-13106

7. One provision of this act requires the SEC to regulate the market in blood diamonds. The Brown-Kaufman amendment to this bill was voted down. Before it passed the Senate, the Durbin Amendment was added to it. This act reimposed some restrictions from the Glass-Steagall Act with its Volcker Rule, and was intended to end the idea of "too big to fail." This 848-page act is named for two Democratic senators from Connecticut and Massachusetts. For 10 points, name this act signed in 2010 to regulate the financial system.

ANSWER: **Dodd-Frank** Act

080-12-70-13107

8. The most common Sanskrit form of this construct is the *shloka*. In ancient Greek, this can be analyzed using units known as *morae*, and in many languages it is ascertained and marked using scansion. In English literature, this rarely features caesuras and is usually divided into dactyls, trochees, and other "feet" such as the iamb. For 10 points, name this term for the rhythmic structure of a line of poetry.

ANSWER: poetic **meter** [prompt on **prosody**; prompt on **stress**]

104-12-70-13108

9. Certain verbs in this tense are pronounced as if the second accent ague (ahg-YOO) is an accent grave (GROV), though usually they are not written to reflect the change. Verbs which become irregular in this tense include "pleuvoir," which becomes "il pleuvra." In regular verbs, this tense is formed by taking the infinitive as a stem and adding the endings "ai," "as," "a," "ons," "ez," or "ont." For 10 points, name this French verb tense, used to refer to actions that will happen after the present.

ANSWER: French **future** tense [or le **futur**]

019-12-70-13109

10. A group of later criminal defendants in this country announced themselves in October 2011 by playing the song "Kill the Sexist" while wearing ski masks. In this country, former members of the art collective "War" were convicted of the crime "hooliganism motivated by religious hatred" after performing a song structured as a prayer to the Virgin Mary at the Cathedral of Christ the Saviour. For 10 points, name this country where members of an all-female punk band were prosecuted for breaking into an Orthodox church to denounce Vladimir Putin.

ANSWER: **Russia** [or **Russian** Federation]

019-12-70-13110

11. Fukui believed that reactions could entirely be modeled by analyzing the so-called "frontier" ones. These entities are found by finding the radial and angular components of a certain system's wavefunctions. One type of these entities is classified by whether they are formed by adding or subtracting wavefunctions and can be bonding or antibonding. Large atoms can have g, f, and d varieties of these constructs. Smaller atoms have only s and p ones of these. For 10 points, name these approximate paths in which electrons travel around the nucleus of an atom.

ANSWER: **orbitals** [accept **molecular orbitals** before "molecular"; accept **atomic orbitals** at any time]

131-12-70-13111

12. The results of this scientist's most famous experiments were published in *New Experiments Physico-Mechanicall, Touching the Spring of the Air and Its Effects*. In order to conduct those experiments, this scientist, inspired by Otto von Guericke (GEH-rih-kuh), had his assistant, Robert Hooke, design a more advanced air pump. The publication of his *The Sceptical Chymist* is considered to have founded modern chemistry. For 10 points, identify this scientist who formulated the inverse relationship between the pressure and volume of a gas.

ANSWER: Robert **Boyle**

066-12-70-13112

13. This founder of the newspaper *The Commoner* resigned from his last government post after the *Lusitania* sinking made war seem inevitable. This man was called to Tennessee to defend the Butler Act. Called the "Boy Orator of the Platte" for his Nebraska origins, this man faced off against Clarence Darrow in the Scopes Monkey Trial. For 10 points, name this populist and Democrat who lost in three presidential elections and gave the "Cross of Gold" speech.

ANSWER: William Jennings **Bryan**

104-12-70-13113

14. One king of this country built a stone pyramid called the Bakong. A later king of this country built a sandstone shrine called Banteay Srei (BAN-tay SRAY). This country ruled by Indravarman I and Jayavarman V was later ruled by a dictator who sought to return to "Year Zero" and established the Killing Fields. This country once ruled by Pol Pot is home to the temple complex of Angkor Wat. For 10 points, name this Southeast Asian country taken over in the 1970s by the Khmer Rouge.

ANSWER: Kingdom of **Cambodia** [or Preahreacheanachakr **Kampuchea**]

014-12-70-13114

15. One of this author's poems begins, "Among the rain and lights I saw the figure 5 in gold." He used the title "Poem" for a work about a cat that stepped down "into the pit of the empty flowerpot." This author wrote "I have eaten the plums that were in the icebox" in his oft-parodied poem "This Is Just to Say." For 10 points, name this poet and pediatrician who wrote that "so much depends upon" the title object in "The Red Wheelbarrow."

ANSWER: William Carlos **Williams**

015-12-70-13115



1A. Identify the southwestern state of Australia which lies across the Bass Strait from Tanzania, contains Melbourne, and is named for a monarch.

ANSWER: **Victoria**

1B. What operation, when applied to two sets, yields a new set that contains all the elements in both of the input sets?

ANSWER: **union**

2A. What effect, in which a magnetic field is applied perpendicular to a wire, demonstrates that electrical charge carriers are negatively charged?

ANSWER: **Hall effect**

2B. The end of the era of what type of movie was the subject of *Singin' in the Rain*, an example of which is the 2011 movie *The Artist*?

ANSWER: **silent movies** [accept reasonable equivalents]

3A. What plant tissue, made of sieve tubes and companion cells, carries nutrients such as sugar through the plant?

ANSWER: **phloem**

3B. Name the British poet who wrote "To a Skylark" and "Ode to the West Wind."

ANSWER: Percy Bysshe **Shelley**

4A. What Greek hero rescued Andromeda from a sea monster and was the son of Zeus, who impregnated his mother in the form of a shower of gold?

ANSWER: **Perseus**

4B. What American composer of *Chicester Psalms* and the *Kaddish* symphony wrote the score to *West Side Story*?

ANSWER: Leonard **Bernstein**

5A. Independence, Overland Park, Lee's Summit, and Shawnee are suburbs of what city, where the Google Fiber project, offering free, ultra-high-speed Internet access covering most of the city, began construction in September 2012?

ANSWER: **Kansas City**, Missouri

5B. This is a 20-second calculation question. What is the positive root of $-32x^2 - 36x + 18$?

ANSWER: $x = \mathbf{\frac{3}{8}}$

6A. This is a 20-second calculation question. If the length of each side of a triangle is tripled, how many times greater will the area be?

ANSWER: **9** times greater

6B. What philosopher, who advocated the "five relationships" and the "reification [RAY-if-uh-cay-shun] of names," was an adviser to the King of Lu whose ideas were spread throughout China by disciples and the book *The Analects*?

ANSWER: **Confucius** [or **Kongfuzi**; or **Kongzi**; or **K'ung-fu-tzu**; or **K'ung-tzu**; or **Kongqiu** (kon-chi); or **Zhongni**]

7A. Name these visible aggregates of tiny water droplets or ice crystals in the atmosphere that help warm the Earth by reflecting infrared wavelengths.

ANSWER: **clouds**

7B. Which Beatle recorded "Imagine" as a solo artist and also recorded albums with his wife, Yoko Ono?

ANSWER: John Winston Ono **Lennon**

8A. This is a 30-second calculation question. What is the positive slope of a line that makes an angle of 60 degrees with the x-axis?

ANSWER: **root 3** [or **radical 3**; prompt on **tan(60)**]

8B. This is a 30-second calculation question. If there are 8 people in a room and each person shakes the hand of every other person exactly once, what is the total number of handshakes?

ANSWER: **28**

9A. What American painter of *The Gulf Stream* painted children enjoying the title game in front of a schoolhouse in his work *Snap the Whip*?

ANSWER: Winslow **Homer**

9B. What British writer-composer duo produced a series of comic operas including *The Mikado* and *The Pirates of Penzance*?

ANSWER: William Schwenk **Gilbert** and Arthur **Sullivan**

10A. Which word denotes both the bread divinely given to the Israelites and a magic life force found in the belief system of some Pacific islands?

ANSWER: **mana**

10B. This is the number of fluorine atoms attached to the most common molecular form of uranium, as well as the smallest number that is the product of two primes.

ANSWER: **six**



1. In one story by this author, Petro murders the child Ivas in Bear's Ravine as part of a deal with the devil to obtain treasure. This author of "St. John's Eve" also wrote about the barber Ivan Yakovlevich (yuh-KOFF-luh-vitch) cutting open a loaf of bread to discover a body part belonging to Major Kovalyov. In another of his stories, the clerk Akaky Akakievich (uh-KAH-kee AH-kah-KYAY-vitch) returns as a ghost after he dies in despair from being robbed of the title article of clothing. For 10 points, name this Russian author of "The Nose" and "The Overcoat."

ANSWER: Nikolai **Gogol**

014-12-70-13117

2. In this novel, one character avoids seeing his love interest by sending a requested saddle by courier rather than delivering it in person. This novel begins by asserting, "Happy families are all alike; every unhappy family is unhappy in its own way." This novel's secondary plotline follows Levin's courtship of Kitty. After having an affair with Count Vronsky, the title character of this novel ultimately commits suicide by throwing herself in front of a train. For 10 points, name this novel by Leo Tolstoy.

ANSWER: ***Anna Karenina***

014-12-70-13118

3. While this case was in process, John Catron was urged by the President-elect to settle with the majority decision before his inauguration. The plaintiff argued about his trip with the Emerson family to what is now Wisconsin, though the defendant in this case was John Sanford. This case's seven to two opinion under Chief Justice Roger Taney annulled the Missouri Compromise. For 10 points, name this 1857 case that ruled that black people had no rights.

ANSWER: *Dred **Scott** v. John F.A. Sandford* [or Dred **Scott** decision; accept *John F.A. **Sandford** v. Dred Scott* before "Sandford" is read]

104-12-70-13119

4. This man shared leadership responsibilities for a time with Henri Giraud while headquartered in Algiers. This man's BBC broadcast on June 18th urged the people of his country to resist a government run on the principles of "Work, Family, Fatherland" by Pierre Laval and Philippe Petain. For 10 points, name this man who dealt with the Algerian Crisis as president of the Fifth Republic and who led the Free French Forces during World War II.

ANSWER: Charles Andre Joseph Marie **de Gaulle**

023-12-70-13120

5. The most common representation of these numbers always normalizes the first bit to one, negating the need to store it and providing an extra bit of precision. That representation allows these numbers to be represented with a sign, exponent and mantissa, comes in single, double and quad-precision formats and is the IEEE 754 standard. Missing entries in the lookup table of the Pentium 5 FPU caused division of these numbers to produce incorrect results. For 10 points, identify this representation of real numbers on computers, whose data type is commonly "float."

ANSWER: **floating-point** numbers [or **floats** before "float" is read]

066-12-70-13121

6. This poet wrote that “Not all the vats upon the Rhine yield such an alcohol!” in a work which begins “I taste a liquor never brewed.” Her work was published by her friend Thomas Wentworth Higginson. One of her poems begins, “I’m nobody! Who are you? Are you nobody, too?” This poet wrote, “The carriage held but just ourselves - and immortality” in a poem which begins, “Because I could not stop for Death.” For 10 points, name this reclusive New England poet.

ANSWER: Emily **Dickinson**

015-12-70-13122

7. The reason that carbenes are so reactive is they violate this principle. This principle, a consequence of Abegg’s rule, is violated by compounds with trigonal bipyramidal and octahedral molecular geometries. Other exceptions to it are the electron-deficient compounds, including most of those with boron as a central atom. Violators of this rule that have five or more groups surrounding the central atom are said to have expanded valence shells. For 10 points, name this chemical rule of thumb that states that central atoms of most covalent compounds are surrounded by eight electrons.

ANSWER: **octet** rule

131-12-70-13123

8. One king from this house was an ineffective ruler due to injuries sustained when he was kicked by a horse; that was Robert III. An attempt to restore this house to one throne it controlled included the Fifteen and Forty-Five Rebellions and was known as Jacobitism. This house's last reigning monarch was Queen Anne, whose childless death led George I of Hanover to take the throne. For 10 points, identify this ruling house of Scotland and England, whose rulers also included James I and Charles I.

ANSWER: House of **Stuart** [or **Stuarts**]

019-12-70-13124

9. This man wrote a work about Fred, Jake, and Bridget’s relationships with their dying father, Andy. This author of *Moonlight* depicted Emma and Jerry’s affair in reverse-chronological order in *Betrayal*. This playwright created the hitmen Ben and Gus, and, in another work, Meg organizes the title event for Stanley Webber, during which he is abducted by McCann and Goldberg. For 10 points, name this British playwright of *The Dumb Waiter* and *The Birthday Party*.

ANSWER: Harold **Pinter**

191-12-70-13125

10. At the first one of these events, Mr. T competed against a man whose theme song involved bagpipe music, Roddy Piper. At the twentieth of these events, Goldberg and Brock Lesnar competed with Steve Austin officiating. In 2011, the twenty-eighth of these events featured the Rock beating John Cena, while Hulk Hogan beat Andre the Giant at the third one. For 10 points, name this annual pay-per-view event, run every year since 1985 by World Wrestling Entertainment.

ANSWER: **WrestleMania**

052-12-70-13126

11. One approximation related to these objects states that the index of refraction minus one times the difference between the reciprocal of the radii of curvature equals the inverse of a certain quantity. That approximation is the thin "this device" approximation. When an object is placed off their primary axis they create comas. Their focal length over their focal length minus their distance from an object is equal to their magnifying power. For 10 points, name these optical devices that refract light and come in concave and convex forms.

ANSWER: **lens**

149-12-70-13127

12. This conflict was opposed by the Congressional "spot resolutions" that challenged official accounts of the Thornton affair. This war merged with the Bear Flag Revolt. This conflict, alluded to in the first line of the US Marine Hymn, made Zachary Taylor a household name after Buena Vista. After this war, America gained millions of acres by the Treaty of Guadalupe Hidalgo. For 10 points, name this war during James K. Polk's presidency between the US and its southern neighbor.

ANSWER: **Mexican**-American War

104-12-70-13128

13. This substance is used to explain why galaxy rotation curves do not drop off as predicted. This substance was proposed after Fritz Zwicky's observations of the Coma cluster. It contributes roughly 27 percent of the universe's energy density. Black holes and neutron stars were proposed as MACHOs, which, along with WIMPs, make up the cold form of this substance. For 10 points, name this invisible form of matter that is thought to exist in space.

ANSWER: **dark matter**

149-12-70-13129

14. Michelle Alexander wrote about the racist use of these places in her 2010 book *The New Jim Crow*. A simulation of these places put reflective sunglasses on a man nicknamed "John Wayne." Michel Foucault criticized the Panopticon design for these places, in which one person can see everyone else. A fake one was shut down after six days by Philip Zimbardo in an out-of-control Stanford hallway. For 10 points, name these institutions with guards and inmates.

ANSWER: **prisons** [or **jails**]

104-12-70-13130

15. One tributary of this river gains its name from the clay sediments carried into it above Malakal by the Sobat River. Another tributary of this river is sometimes called the Abay River and flows out of Lake Tana. Abu Simbel was forced to relocate when a decision was made to dam up this river. The man-made Lake Nasser was created by water from this river being diverted by the Aswan High Dam. For 10 points, name this river with Blue and White tributaries that is the longest in the world.

ANSWER: **Nile** River [or Bahr Al-**Nil**; or Nahr Al-**Nil**]

023-12-70-13131



1. Cancer of the cells producing this hormone can be treated with streptozotocin, and those cells release this hormone after the closing of a potassium channel. This hormone is activated after the cleaving off of a C-peptide, and it works by binding to a tyrosine kinase receptor. This hormone, released from the beta cells of the islets of Langerhans, promotes the synthesis of glycogen and accelerates glycolysis, and is typically released after a meal. For 10 points, name this pancreatic hormone that decreases blood sugar levels, which is deficient in diabetes.

ANSWER: insulin

048-12-70-13132

2. A temple to this ruler in Ankara contained the *Res Gestae*, this man's account of his own achievements. Invoking his "moral reforms" that outlawed adultery, this emperor banished his promiscuous daughter, Julia. This ruler screamed, "Quintilius Varus, give me back my legions!" after hearing of the Battle of the Teutoburg Forest. This man's general, Agrippa, defeated Mark Antony at the Battle of Actium. For 10 points, name this adopted son of Julius Caesar and first Roman emperor.

ANSWER: Augustus Caesar [or Gaius Julius Caesar Octavianus; or Gaius Octavius; prompt on Caesar; do not accept or prompt on "Julius Caesar" or "Gaius Julius Caesar"]

080-12-70-13133

3. This novelist released a detective story about Doc Sportello titled *Inherent Vice* in 2009. In one of his novels, a muted horn is used as a symbol for the postal service Trystero. That novel features Oedipa Maas uncovering a conspiracy and attending the title auction. Another of his novels begins, "A screaming comes across the sky," and concerns the relationship between Tyrone Slothrop and V-2 rockets. For 10 points, name this reclusive author of *The Crying of Lot 49* and *Gravity's Rainbow*.

ANSWER: Thomas Pynchon

015-12-70-13134

4. The only known natural, self-sustaining form of the process denoted by this term occurred at Oklo in Gabon. In biology, this term is applied to a process in which the protein FtsZ starts the formation of a septum. In physics, this term denotes a process first demonstrated by a team led by Otto Hahn. In biology, this term applies to a form of bacterial replication and is prefixed by binary when the parent splits into two daughters. For 10 points, identify this term that, in physics, is a process in which an atom's nucleus is split apart.

ANSWER: fission

066-12-70-13135

5. In one work, this man created Clive Durham and Alec Scudder, who are both lovers of the title character, *Maurice*. In another work by this author, Helen tries to help Leonard Bast with advice from Mr. Wilcox, costing him his job. That work ends with the union of the Wilcox and Schlegel families at the title estate. Another novel by this author of *Howards End* sees Dr. Aziz accused of sexually assaulting Adela Quested in the Marabar Caves. For 10 points, name this British author of *A Passage to India*.

ANSWER: E. M. Forster [or Edward Morgan Forster]

191-12-70-13136

This is a calculation question. How many cubes of side length 2 can fit in a cube with side length 10?

ANSWER: 125

Name the month of the Islamic calendar in which Muslims must fast from dawn to dusk.

ANSWER: **Ramadan**