



### Question #1: Miscellaneous

10 points

The corporate version of this tax was eliminated in the Tax Cuts and Jobs Act of 2017, which also made adjustments so that fewer people pay this tax through 2025. Because this tax was not originally indexed for inflation, it went from targeting a few hundred people in 1970 to affecting 5 million taxpayers in 2017. This tax was passed by Congress in 1969 after the Secretary of the Treasury announced that 155 high-earning families paid no taxes. Name this income tax that disallows many deductions and that in theory puts a floor on the percentage of income that a filer must pay.

alternative minimum  
tax [accept AMT; prompt  
on minimum tax]

### Question #2: Literature

10 points

At the beginning of one play by this writer, a woman brings her husband corn flakes, but the next day they are out of corn flakes. This writer has the husband receive a drum as a gift, but he trips over the drum, and the drum is then thrown in the fireplace. In another play by this writer, the two characters discuss an 87-year-old man who was killed when he tried crawling under a truck. In that play, the title device has a speaking tube that is used by Ben and Gus, who are hit men. Name this English playwright who wrote *The Birthday Party* and *The Dumb Waiter*.

Harold Pinter



### Question #3: Mathematics

*10 points*

<p>The numbering system named for this person assigns a natural number to every symbol and formula within a system. This person simplified work done by John von Neumann [NOY-mun] and Paul Bernays to create a version of set theory that made it easier to use classes. This person proved that Hilbert's program was unattainable by proving that any formalized system that contains elementary arithmetic cannot be used to prove its own consistency. Name this European-born American mathematician who proved that any formal mathematical system is incomplete.</p>	<p>Kurt (Friedrich) <u>Gödel</u> ["girdle"]</p>
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### Question #4: Social Studies

*10 points*

<p>This U.S. law led to the creation of State Implementation Plans and New Source Performance Standards. The original version of this law in 1963 was enforced by the Public Health Service and the Department of Health, Education, and Welfare, but a new agency was created to enforce this law before its major expansion in 1970. After that expansion, William Ruckelshaus directed much of this law's enforcement against the auto industry. A 1990 expansion of this law addressed acid rain. Name this law administered by the Environmental Protection Agency that now addresses ozone layer protection and climate change.</p>	<p><u>Clean Air Act</u> [accept <u>CAA</u>]</p>
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### Question #5: Science

10 points

This type of hydrocarbon can be created by a two-step process that changes an **aldehyde** [AL-duh-“hide”] to a **dibromoalkene** [“die”-BROH-moh-AL-keen], which is then treated with lithium to complete the Corey–Fuchs [fooks] reaction. A **trimerization** [“TRY”-mur-ih-ZAY-shun] of three of these molecules creates benzene. The second-simplest example of this type of hydrocarbon is an **isomer** [“ICE”-oh-mur] of **propadiene** [proh-puh-“DIE”-een]. In these hydrocarbons, if there are  $n$  carbon atoms, then there are  $2n$  minus 2 hydrogen atoms. Name this class of compounds characterized by a triple bond between carbon atoms and whose simplest example is **acetylene** [uh-SEH-tuh-leen], which is also called **ethyne** [EH-“thine”].

**alkynes** [AL-“kine”s] [the vowel must be long I; do not accept “alkene” or “alkane”; prompt on **acetylenes**]

### Question #6: Literature

10 points

One novel by this author begins with Mrs. Castle calling the narrator to the house of the narrator’s mother. In that novel by this author, the narrator, Helen Knightly, kills her elderly mother. Early in another novel by this writer, one of the characters says “Don’t let me startle you” to the 14-year-old protagonist. This author then describes the protagonist being led to an underground shelter in a cornfield. This author has Susie Salmon narrate that novel from Heaven after she is killed. Name this 21st-century American author of *The Almost Moon* and *The Lovely Bones*.

Alice **Sebold**



**Question #7: Fine Arts**

10 points per part

Name these artists who were born in 15th-century Florence:		
1	This artist painted <i>Primavera</i> and <i>The Birth of Venus</i> .	Sandro <b>Botticelli</b> [ <b>boh-tee-CHELL-lee</b> ] [or Alessandro (di Mariano) <b>Filipepi</b> ]
2	This artist made frescoes for the <b>Brancacci</b> [ <b>brahn-KAHT-chee</b> ] Chapel, including <i>The Tribute Money</i> .	<b>Masaccio</b> [ <b>mah-SAHT-choh</b> ] [or Tommaso di Ser Giovanni di <b>Simone</b> ]
3	This artist painted <i>Vocation of the Apostles</i> for the Sistine Chapel and frescoes showing John the Baptist and Mary for the <b>Tornabuoni</b> [ <b>tor-nah-BWOH-nee</b> ] Chapel.	Domenico <b>Ghirlandaio</b> [ <b>gir-lahn-DY-oh</b> ] [or Domenico di Tommaso <b>Curradi</b> ]

**Question #8: Fine Arts**

10 points per part

Name these artists who painted madonnas, which show Mary with or without young Jesus:		
1	This artist's many Madonnas include the <i>Sistine Madonna</i> , <i>Madonna of the Pinks</i> , and <i>Madonna of the Goldfinch</i> . He also painted <i>The School of Athens</i> .	<b>Raphael</b> [or <b>Raphaello Sanzio</b> da Urbino or Raphael <b>Santi</b> ; accept any underlined name]
2	This Mannerist painter was still working on <i>Madonna with the Long Neck</i> when he died in 1540.	Il <b>Parmigianino</b> [or <b>Parmigiano</b> or Girolamo Francesco Maria <b>Mazzola</b> ]
3	This painter created <i>Enthroned Madonna and Child</i> and <i>Madonna and Child with Saints</i> during the 1430s, long before his <i>Madonna of Humility with Saints</i> .	(Fra) Filippo <b>Lippi</b> [accept Lippo <b>Lippi</b> ]



### Question #9: Science

*10 points per part*

Planck's law gives the spectral radiance of this type of surface.		
<b>1</b>	Name this ideal surface that completely absorbs all incident radiant energy.	<b><u>blackbody</u></b>
<b>2</b>	Planck's law helped explain why this prediction of infinite energy radiation did not occur.	<b><u>ultraviolet catastrophe</u></b> [accept <b><u>Rayleigh–Jeans catastrophe</u></b> ]
<b>3</b>	The ultraviolet catastrophe was predicted by this theorem, which is based on an assumption of an energy continuum. This theorem explains why 1/2 times Boltzmann's constant times temperature is multiplied by 3 in three dimensions.	<b><u>equipartition</u></b> of energy theorem

### Question #10: Science

*10 points per part*

Metalloids, such as silicon and germanium, tend to be these types of materials.		
<b>1</b>	Name these materials used in integrated circuits that allow the passage of electricity better than insulators but not as well as metals.	<b><u>semiconductors</u></b> [or <b><u>semiconducting materials</u></b> ]
<b>2</b>	Phosphorus or arsenic are used to dope this type of semiconductor that has more free electrons than free holes.	<b><u>n</u></b> -type semiconductor
<b>3</b>	Semiconductors are often explained using these collections of energy states. All materials have "conduction" and "valence" examples of these things, and semiconductors have a small "gap" named for these things.	<b><u>bands</u></b>



### Question #11: Social Studies

10 points per part

An externality is an indirect cost or benefit to people who are not the primary producers or consumers of a product.		
<b>1</b>	This product, which drivers are required to have in Illinois, causes a negative externality because it lowers the incentive to drive carefully, but it also provides a positive externality because it guarantees that an accident victim will be compensated.	(auto or car or liability) <b><u>insurance</u></b>
<b>2</b>	This economist described externalities in <i>The Economics of Welfare</i> and proposed a tax on them.	Arthur (Cecil) <b><u>Pigou</u></b> <b>[pig-oo]</b>
<b>3</b>	In the Coase theorem on externalities, it is important that these rights are well-defined, but it does not matter whom these rights belong to.	<b><u>property</u></b> rights

### Question #12: Social Studies

10 points per part

This concept was often illustrated by comparing the manufacture of wine and cloth in England and Portugal.		
<b>1</b>	Give the two-word name for this concept that promotes trade even when one country is better at producing every good than another.	<b><u>comparative advantage</u></b>
<b>2</b>	Comparative advantage was described in this English economist's book <i>On the Principles of Political Economy and Taxation</i> .	David <b><u>Ricardo</u></b>
<b>3</b>	This Swedish economist believed that Ricardo's theories were too simplified and worked with his former teacher Eli Heckscher to develop a more sophisticated model.	Bertil (Gotthard) <b><u>Ohlin</u></b>



**Question #13: Literature**

10 points per part

This novel asks “When first the world from chaos rose, tell me, how did love begin?”		
1	Name this novel in which an object begs a Taoist priest and a Buddhist monk to let it see the world.	<u><i>Dream of the Red Chamber</i></u> [accept <i>The Story of the Stone</i> or <i>Honglou Meng</i> or <i>Shitou Ji</i> ]
2	<i>Dream of the Red Chamber</i> is one of the great classic novels from this country.	<u>China</u> [accept <u>Zhongguo</u> ; accept People’s Republic of <u>China</u> or <u>PRC</u> or <u>Zhonghua Renmin Gongheguo</u> ]
3	In <i>Dream of the Red Chamber</i> , Daiyu puts these objects in a silk bag and buries them in a grave.	<u>flowers</u> [accept flower <u>petals</u> ]

**Question #14: Literature**

10 points per part

One of the gods in this play says “Show interest in her goodness—for no one can be good for long if goodness is not in demand.”		
1	Name this play in which Shen Teh starts a tobacco shop and sometimes pretends to be her male cousin Shui Ta.	<i>The <u>Good Person of Szechwan</u></i> [or <i>Der gute Mensch von Sezuan</i> or <i>The <u>Good (Wo)man of Setzuan</u></i> ]
2	This German playwright wrote <i>The Good Person of Szechwan</i> in addition to <i>The Threepenny Opera</i> .	(Eugen) Bertolt (Friedrich) <u>Brecht</u> [BAIR-tohlt <u>brekt</u> ]
3	This composer worked with Brecht on <i>The Threepenny Opera</i> .	Kurt (Julian) <u>Weill</u> [ <u>“vile”</u> ]



**Question #15: Science**

*10 points*

<p>The MAVEN spacecraft has an ion analyzer to study this phenomenon, which is blamed for the long-term atmospheric stripping of Mars. Kristian Birkeland [BURK-lahnd] determined the composition of this phenomenon by observing his namesake currents in the Auroras Borealis and Australis. The magnetopause [mag-NEE-toh-“pause”] is the location where the dynamic pressure of this phenomenon is balanced by the dynamic pressure of the magnetosphere [mag-NEE-toh-“sphere”]. Both radiation pressure and this phenomenon are responsible for the direction of comets’ tails. Name these particles in our solar system that have been accelerated by the outer region of the Sun.</p>	<p><u>solar wind</u></p>
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**Question #16: Social Studies**

*10 points*

<p>This politician is credited with the quote “So far from God, so close to the United States.” This person was recognized as the general in chief of the army in the Plan of Tuxtepec [TOOKS-tah-pek], which this person drafted. This politician supported Manuel González as his successor but then criticized González after a few years. This person was supported early in his career by Benito Juárez [WAH-rez], but this person eventually ran against Juárez and protested the election results showing he won. Name this person who was the President of Mexico during most of the years from 1876 to 1911 before losing power to Francisco Madero and the Mexican Revolution.</p>	<p>(José de la Cruz) Porfirio <u>Díaz</u> (Mori)</p>
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**Question #17: Fine Arts**

10 points

An opera by this composer contains a duet whose title means “Now, Sir, Listen to a Word or Two.” That duet is sung by **Jeník** [YEN-ik] and **Kecal** [KET-zahl] in this composer’s opera about Jeník and **Mařenka** [mar-ZHEN-kah]. This composer also wrote a set of six symphonic poems whose best-known section has rising alternating eighth notes and quarter notes peaking at dotted quarter notes. This composer ended that set with a piece about **Blaník** [blah-NEEK], a real mountain that contains a legendary army led by Saint **Wenceslas** [VEN-suss-lahss]. Name this Czech composer of *The Bartered Bride* whose cycle *Má vlast* contains *The Moldau*.

**Bedřich Smetana**  
[BED-rikh  
**SMEH-tah-nah]**

**Question #18: Literature**

10 points

In some depictions, this god gave legendary King **Erichthonius** [air-ik-THOH-nee-uss] of Athens to Athena for adoption. This god successfully predicted that Zeus would be victorious with the help of the Hundred-Handers, who were her offspring. According to Hesiod, this god also gave birth to the three **Cyclopes** [“sigh”-KLOH-pee]. This god also helped Cronos castrate Uranus, and she then used the blood to conceive the Giants. This god was both the mother and wife of Uranus, and her earlier union with him created the Titans, including Cronos. Name this deity who was the Greek version of Mother Earth.

**Gaia** [accept **Terra**,  
prompt on Mother **Earth]**



**Question #19: Science**

10 points

This hormone was traditionally called “**interstitial** [IN-tur-STISH-ull] cell stimulating hormone” in men, but the current trend is to use the same name in men and women. This hormone stimulates the **theca folliculi** [THEE-kuh fuh-LIK-yoo-ly] cells. This hormone increases the activity of **Leydig** [“LIE-dig”] cells but not the activity of Sertoli cells. As opposed to another hormone that surges during the early follicular phase, this one surges a little later. Name this hormone that acts synergistically with follicle-stimulating hormone to increase production of testosterone and to develop the corpus **luteum** [LOO-tee-um] while triggering ovulation.

**luteinizing** hormone  
[accept **LH** or **lutropin**]

**Question #20: Social Studies**

10 points

This conflict was the first one involving the USS *United States*, which was captained by John Barry. Much of the American effort during this conflict was overseen by Benjamin Stoddert. Much of the major fighting during this conflict was in the Caribbean Sea, and an invasion of **Curaçao** [“CURE”-uh-sao] was part of both the War of the Second Coalition and this conflict. This conflict followed a failed negotiation attempt by Charles Cotesworth Pinckney, John Marshall, and Elbridge Gerry that became known as the XYZ Affair. Name this undeclared conflict between the U.S. and France from 1798 to 1800.

**Quasi**-War [prompt on **Undeclared** War with France or the **Pirate** Wars or the **Half** War]



### Question #21: Literature

10 points per part

In this play, Lord Darlington says “I can resist everything except temptation.”		
1	Name this play in which one of the characters tries to protect the identity of Mrs. Erlynne.	<i><u>Lady Windermere’s Fan</u></i> (, <i>A Play About a Good Woman</i> )
2	This author wrote <i>Lady Windermere’s Fan</i> and several other plays, but only one novel: <i>The Picture of Dorian Gray</i> .	Oscar (Fingal O’Flahertie Wills) <u>Wilde</u>
3	One of Wilde’s other plays is about this Biblical woman. <u>Richard</u> [REEK-hart] Strauss wrote an opera based on Wilde’s play.	<u>Salome</u> [sal-oh-may]

### Question #22: Literature

10 points per part

A description of this character states “There was no door that he would not heave off its hinges, or break it by running at it with his head.”		
1	Name this character who tells a story in which John’s wife Alison has an affair with Nicholas and tricks Absolon.	the <u>Miller</u>
2	The Miller is a character in this 14th-century collection by Geoffrey Chaucer.	<i>The <u>Canterbury Tales</u></i>
3	In “The Miller’s Tale”, three of these objects are hung from the roof.	kneading <u>tubs</u> [accept kneading <u>troughs</u> or bath <u>tubs</u> ]



**Question #23: Mathematics**

*10 points per part*

This system can be extended into three dimensions using cylindrical coordinates or using spherical coordinates.		
<b>1</b>	Name this two-dimensional system in which each point is specified by the distance to the origin, $r$ , and the angle to the right half of the $x$ -axis, theta.	<b>polar</b> coordinate system or <b>polar</b> coordinates
<b>2</b>	In polar coordinates, this class of shapes is generated by equations of the form “ $r$ equals $a$ plus $b$ sine theta”. Cardioids are a subclass of these shapes.	<b>limaçons</b> [ <b>lim-uh-sawns</b> ]
<b>3</b>	Find the $x$ -coordinate corresponding to the point with coordinates “ $r$ equals 6, theta equals two-thirds pi”. You do not need to find the $y$ -coordinate.	<b>-3</b> [do not prompt on “3”]

**Question #24: Mathematics**

*10 points per part*

Graphing the equation “ $x$ squared minus $y$ squared equals zero” produces a shape that can be interpreted as this type of conic section.		
<b>1</b>	Give this adjective used to describe cases that are much simpler than normal cases.	<b>degenerate</b>
<b>2</b>	The graph of “ $x$ squared minus $y$ squared equals zero” most nearly resembles what letter of the English alphabet?	<b>x</b> [accept answers that additionally specify either case]
<b>3</b>	Find the slope of either part of the degenerate hyperbola made by graphing “ $x$ squared minus 4 $y$ squared equals zero”.	(plus and/or minus) <b>1/2</b> [or (plus and/or minus) <b>0.5</b> ]



### Question #25: Science

10 points per part

This compound is dangerous because it combines with hemoglobin to prevent oxygen from being distributed in the body.		
1	Name this compound created by the incomplete combustion of fuel.	<b>carbon monoxide</b> [accept <b>CO</b> ]
2	A process named for this person and Hans Tropsch converts carbon monoxide and hydrogen into <b>hydrocarbons</b> [" <b>HIDE-row-carbons</b> "]. This person worked under an unrelated scientist with the same last name who developed a type of <b>esterification</b> [eh-STAIR-ih-fih-KAY-shun].	Franz <b>Fischer</b> (who worked with Emil Fischer)
3	The Mond process uses carbon monoxide to purify this element.	<b>nickel</b> [accept <b>Ni</b> ]

### Question #26: Science

10 points per part

Answer the following about <b>acetic</b> [uh-SEE-tik] acid, also known as <b>ethanoic</b> [eth-uh-NOH-ik] acid:		
1	Acetic acid is the main component of this common cooking ingredient.	<b>vinegar</b> [accept specific types of vinegar as long as <b>vinegar</b> is mentioned]
2	Acetic acid is the second-simplest example of this class of compounds. The simplest example is formic acid.	<b>carboxylic</b> [" <b>car-box-ILL</b> "-ik] acids [prompt on <b>organic</b> acids]
3	Removing a <b>hydroxyl</b> [" <b>hide-ROCK-sill</b> "] ion from two acetic acid molecules and then combining them with an oxygen ion creates this compound, which is used to convert cellulose into cellulose acetate.	<b>acetic anhydride</b> [uh-SEE-tik an-" <b>HIDE-ride</b> "] [accept <b>ethanoic anhydride</b> ; prompt on <b>anhydride</b> ]



**Question #27: Social Studies**

*10 points per part*

Answer the following about mining in Africa:		
<b>1</b>	The Kimberley and De Beers mines, which used to be the most productive diamond mines in the world, are located in what is now this country.	(Republic of) <b>South Africa</b> [prompt on <b>RSA</b> ]
<b>2</b>	Johannesburg, South Africa was founded in the 1880s when gold was found in this nearby mountain ridge.	<b>Witwatersrand</b> [ <b>yuht-VAH-turs-rahnt</b> ] [prompt on the <b>Rand</b> ]
<b>3</b>	What used to be the Gold Coast is now part of this African country, which in 1957 became the first colony in sub-Saharan Africa to achieve sovereignty. This small country still exports a lot of gold.	(Republic of) <b>Ghana</b>

**Question #28: Social Studies**

*10 points per part*

The People Power Revolution removed Ferdinand Marcos from being this country’s president in 1986.		
<b>1</b>	Name this country, where Ferdinand’s son, nicknamed “Bongbong”, replaced Rodrigo <b>Duterte</b> [ <b>doo-TAIR-tay</b> ] as president in 2022.	(Republic of the) <b>Philippines</b> [accept (Republika ng) <b>Pilipinas</b> ]
<b>2</b>	This person became president in 1986. Her husband was a critic of Ferdinand Marcos who was assassinated in 1983, and her son has also served as president.	Corazon <b>Aquino</b>
<b>3</b>	In 1942, Filipino and American prisoners of war were forced by Japan to undergo an infamous “death march” named for this Philippine province.	(Province of) <b>Bataan</b> [accept <b>Bataan</b> Death March]



**Question #29: Science**

10 points

Energy density can be found by squaring this quantity's magnitude and multiplying by half of the permittivity of free space. The units of this vector quantity are volts per meter. In an equation similar to **Coulomb's** [koo-lohm'z] law, this quantity equals Coulomb's constant times a single charge divided by distance squared. Gauss's law states that the divergence of this quantity equals charge density divided by the electric permittivity of free space. The Maxwell–Faraday equation states that the curl of this vector quantity equals the opposite of the derivative of the magnetic field with respect to time. Name this vector quantity equal to force per unit charge.

electric field strength  
[accept **E-field**; prompt on **E**]

**Question #30: Literature**

10 points

This person wrote “You built for them a temple in hearing” as the last line in the first poem in his collection of 55 sonnets. This person wrote the advice “Nobody can advise you and help you, nobody” in a letter to Franz Xaver Kappus that was published in a collection after this person died. This poet wrote “Every angel is terrifying” in a collection that was delayed by this writer's service in World War I. In that work, this poet asks “Who, if I cried out, would hear me among the Angelic Orders?”. This poet wrote that poem in a castle near the Adriatic Sea. Name this writer of *Letters to a Young Poet*, *Sonnets to Orpheus*, and the *Duino Elegies*.

(René Karl Wilhelm  
Johann Josef) Rainer  
Maria Rilke



**Question #31: Mathematics**

*10 points*

Functions can have this property but not the “uniform” variant of this property if their derivatives are unbounded. A function that surprisingly has this property everywhere can be written as an infinite sum of a power times a cosine function; that function is the **Weierstrass [VY-ur-shtrahss]** function. This property can be demonstrated with a particular version of a delta-epsilon proof in which it is not required that the absolute value of the difference between  $x$  and the value  $x$  approaches be greater than zero. Every differentiable function also has this property. Name this property that a function has when its limit at a point equals its actual value at that point.

continuity or being  
continuous

**Question #32: Social Studies**

*10 points*

Though the term for these people is usually associated with pre-industrial Europe, in 2018 the United Nations passed a declaration supporting their rights. A war started by these people was harshly condemned by Martin Luther in a tract referring to these people as “murderous thieving hordes”. In that war, these people were stopped by the Swabian League in 1525. A revolt by these people was supported by Lollard priest John Ball. In that revolt, which was suppressed by King Richard II of England, these people were led by Wat Tyler. Give this general term for small rural landowners or agricultural laborers.

peasants [accept bauern  
or German peasants]





### Extra Question #1: Science

10 points

One example of this type of substance is an adhesive called thermoset that can be used to make the type of concrete named for this type of substance. These substances can be mixed organic-inorganic compounds with several uses, such as the combination of silicon, oxygen, and organic molecules in silicone. Teflon is also an example of this type of substance, as is DNA, which explains the name of the enzymes that synthesize DNA. Several of the most common synthetic types of these substances are plastics. The first synthetic thermoplastic example of this type of substance contains repeated **amide** [AM-“eyed”] links and is called nylon. Name this type of substance whose molecules are repetitive.

polymers [prompt on macromolecules]

### Extra Question #2: Fine Arts

10 points

This painter was a contemporary of Joshua Reynolds, who stated that this artist’s best work was *Girl with Pigs*. One painting by this artist shows the English countryside on the right side and a double portrait on the left side, with a woman in a light blue dress sitting on a bench and a man with his elbow resting on the bench. That painting by this artist is *Mr. and Mrs. Andrews*. Another painting by this artist shows a person in 17th-century clothing even though the painting is from the late 18th century. That painting by this artist, which might depict Jonathan Buttall, is named for the color of the person’s outfit. Name this painter of *The Blue Boy*.

Thomas Gainsborough



### Extra Question #3: Literature

10 points

In a story by this writer, the narrator hears a conversation between dogs named Meggy and Fidel. In that story, which this author put in diary form, the narrator goes to Spain and goes insane, with the last entry dated “34 March, February, 349.” In a novel by this writer, the protagonist escapes being beaten when the Superintendent of Rural Police shows up to arrest Nozdrev. That protagonist is more successful dealing with the landowners Manilov and **Sobakevitch** [soh-BAH-kuh-vich]. This author wrote that story about a get-rich-quick scheme by **Chichikov** [CHEE-chuh-kawff]. Name this Russian author of “Diary of a Madman” and *Dead Souls*.

Nikolai (Vasilyevich)  
**Gogol** [GOH-gull]

### Extra Question #4: Mathematics

10 points

The level associated with these intervals is equal to 1 minus alpha. These intervals are often two-sided, but if the goal is establishing an upper or lower window, then they can be one-sided. If the  $p$ -value is greater than alpha, then this interval contains the hypothesized mean. The two-sided versions of these intervals are shown as bars going up and down from a graph. When calculating these intervals, it is common to use the numbers 1.96 or 2.58 depending on whether the level associated with these intervals is set at 95 percent or 99 percent. Name this range of values in which trials are supposed to fall according to a given probability.

**confidence** intervals  
[prompt on **CI**s or  
**confidence levels**]



**Extra Question #5: Social Studies**

*10 points*

This person was sworn in as Chief of Staff of the U.S. Army on the same day that Germany invaded Poland to start World War II. In that position, this person heavily promoted Dwight Eisenhower—who eventually succeeded him—and Operation Overlord. After the war ended, this person tried to prevent a civil war in China and then successfully organized a plan to stop communists in Greece and Turkey, which was the basis of the Truman Doctrine. This person was eventually given a Nobel Peace Prize for his work as secretary of state, especially for giving economic aid to recovering countries. Name this person known for the European Recovery Program.

George C(atlett)  
Marshall (Jr.)



### Extra Question #6: Literature

10 points per part

In this novel, Foster started the Church of the New Revelation.		
1	Name this novel about Valentine Michael Smith, who is brought to Earth after being raised on Mars.	<b><u>Stranger in a Strange Land</u></b>
2	This author wrote <i>Stranger in a Strange Land</i> and <i>The Moon Is a Harsh Mistress</i> .	Robert (Anson) <b><u>Heinlein</u></b>
3	This word, first used in <i>Stranger in a Strange Land</i> , means to understand something by merging with it.	<b><u>grokking</u></b>

### Extra Question #7: Literature

10 points per part

This character is sometimes called John Clayton II, the Earl of Greystoke.		
1	Name this character who was raised by apes in Africa.	<b><u>Tarzan</u></b> of the Apes
2	Tarzan appeared in books by this author, who also wrote the <i>Barsoom</i> series set on Mars.	Edgar Rice <b><u>Burroughs</u></b>
3	In the <i>Barsoom</i> series, this Confederate veteran gets transported to Mars and falls in love with a red Martian princess of Helium named Dejah Thoris.	Captain <b><u>John Carter</u></b> [accept either underlined name]



**Extra Question #8: Mathematics**

*10 points per part*

In this type of quadrilateral, each pair of opposite angles is supplementary.		
<b>1</b>	Give this term for quadrilaterals that can be inscribed in a circle.	<b><u>cyclic</u></b> quadrilaterals
<b>2</b>	The area of a cyclic quadrilateral can be found using a formula named for this 7th-century Indian mathematician.	<b><u>Brahmagupta</u></b> [accept <b><u>Brahmagupta</u></b> 's formula]
<b>3</b>	Brahmagupta's formula uses the semi-perimeter. Find the semiperimeter of a quadrilateral with sides of lengths 2, 3, 5, and 6 units.	<b><u>8</u></b> units

**Extra Question #9: Mathematics**

*10 points per part*

The ceiling and floor functions are sometimes considered this type of function, but some definitions of this type of function require them to have finitely many pieces.		
<b>1</b>	Give this name for piecewise-constant functions.	<b><u>step</u></b> functions [accept <b><u>staircase</u></b> functions]
<b>2</b>	This step function is sometimes called the unit step function. It outputs 1 for positive inputs and 0 for negative inputs.	<b><u>Heaviside</u></b> step function
<b>3</b>	Evaluate the floor function for $-3.7$ .	<b><u>-4</u></b>