

## AFM Benchmark 2

Questions

Settings

Preview

Results

Comments

Questions 1-30 of 30 | Page 1 of 1

## Question 1 (1 point)

Find the range of  $y = \log(x) + 2$ 

- ☐ a  $[1, \infty)$
- ☐ b  $(2, \infty)$
- ☐ c  $(-\infty, \infty)$
- ☐ d  $[2, \infty)$

## Question 2 (1 point)

Consider the graph of  $y = \ln x$  with the limited domain  $(0, 10]$ . What is the maximum value of the function on this interval?

- ☐ a  $\ln 10$
- ☐ b  $\ln 2$
- ☐ c 10
- ☐ d 1

## Question 3 (1 point)

A piecewise function is shown below.

$$f(x) = \begin{cases} cx + 1, & x \leq 2 \\ cx^2 - 1, & x > 2 \end{cases}$$

For what value of  $c$  makes this piecewise defined function continuous?

- ☐ a -1
- ☐ b 1
- ☐ c 4
- ☐ d -2

## Question 4 (1 point)

What value of  $x$  satisfies the equation  $\log_3(x - 4) = 2$ ?

- ☐ a 10
- ☐ b 5
- ☐ c 13
- ☐ d 12

Question 5 (1 point)

The maximum height, in inches, a ball reaches after its first four bounces is shown in the table below.

Bounce Number	Height (in inches)
1	42.0
2	31.5
3	23.6
4	17.7

Which type of function **best** models the data and why?

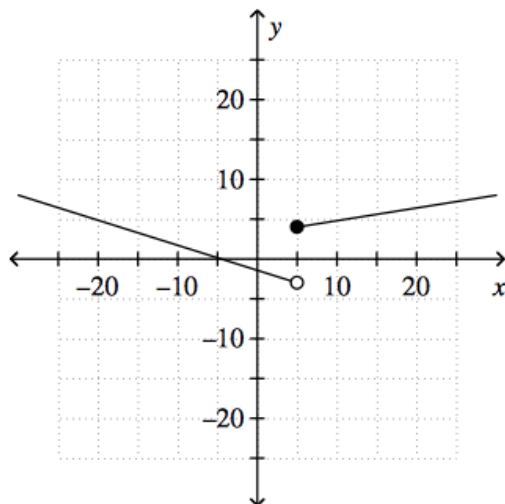
- ☐ a an exponential function, because the height of the ball is decreasing by 75% with each bounce
- ☐ b a logistic function, because the height of the ball is decreasing by 75% with each bounce
- ☐ c a logistic function, because the height of the ball is decreasing by 25% with each bounce
- ☐ d an exponential function, because the height of the ball is decreasing by 25% with each bounce

Question 6 (1 point)

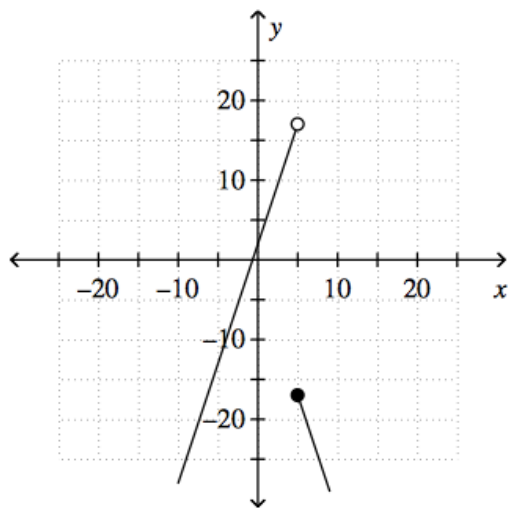
*Determine which is the graph of the given function.*

$$f(x) = \begin{cases} 3x + 2 & \text{if } x < 5 \\ -3x - 2 & \text{if } x \geq 5 \end{cases}$$

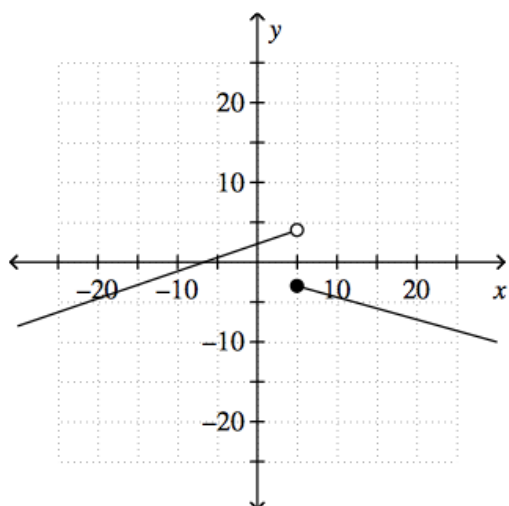
- ☐ a



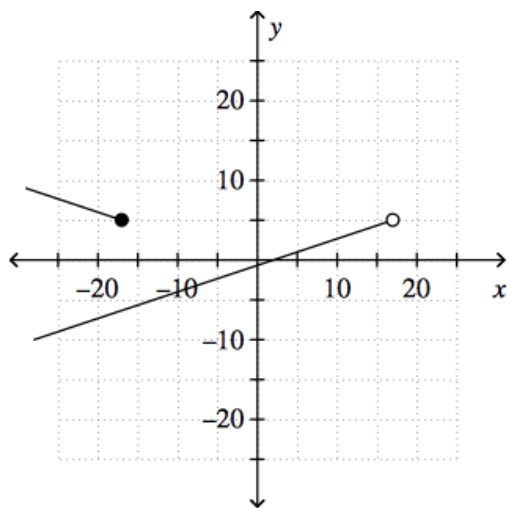
- ☐ b



☐ c



☐ d



Researchers at a computer company conducted a survey on the number of hours computers are being used in households each day. The data from a random sample of 2,100 homes produced a normal distribution with a mean length of time of 5.3 hours per day with a standard deviation of 0.9 hour. Based on the sample, which percentage best represents the percentage of all households that use a computer less than 5 hours or more than 6 hours per day?

- ☐ a 21.8 %
  - ☐ b 58.7 %
  - ☐ c 36.9 %
  - ☐ d 41.2 %
- 

Question 8 (1 point)

The distribution of annual salaries for the 21 employees in a small company has a median of \$45,000 and a standard deviation of \$10,000. The owner of the company promotes one of the employees and the employee's salary increases from \$65,000 a year to \$95,000 a year. What impact will this salary increase have on the median and the standard deviation of annual salaries for this company?

- ☐ a Both the median salary and the standard deviation will change.
  - ☐ b The median salary will increase, but the standard deviation will not change.
  - ☐ c Neither the median salary nor the standard deviation will change.
  - ☐ d The median salary will not change, while the standard deviation will increase.
- 

Question 9 (1 point)

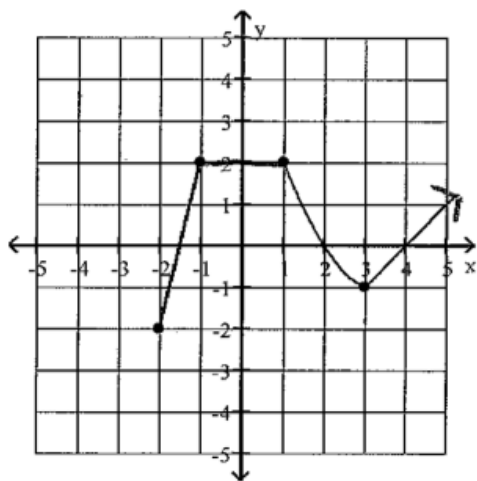
Samantha is estimating the width of a lake. She stands at Point B and looks through a long-range scope. She sees a boat shed at Point A that is about 9 miles away and a tall tree at Point C that is about 7 miles away.

Which of the following is closest to the distance, in miles, across the lake from Point A to Point C?

- ☐ a 9.7
  - ☐ b 10.6
  - ☐ c 12.9
  - ☐ d 11.4
- 

Question 10 (1 point)

Describe the domain of the graph.



- ☐ a The graph is continuous from  $[-2, \infty)$ .
- ☐ b The graph is continuous from  $[-2, 2]$ .
- ☐ c The graph is continuous from  $[-2, 5]$ .
- ☐ d The graph is continuous from  $(-\infty, \infty)$ .

**Question 11** (1 point)

What is the sum of the following infinite geometric series, if it exists?

$$120 + 60 + 30 + 15 + \dots$$

- ☐ a 80
- ☐ b The sum doesn't exist.
- ☐ c 480
- ☐ d 240

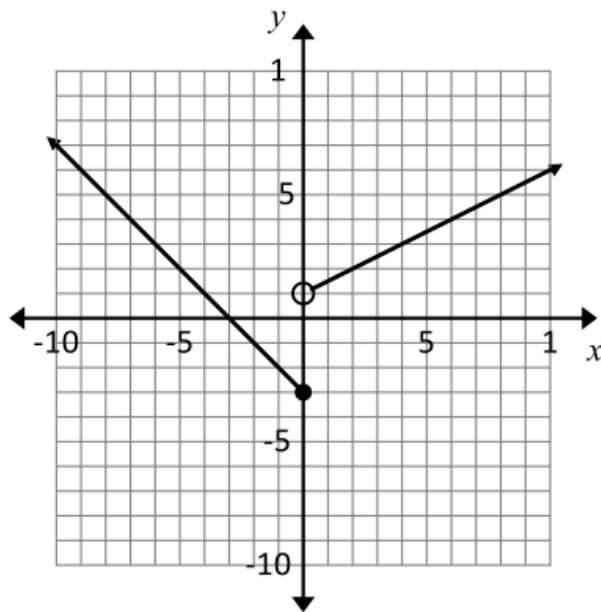
**Question 12** (1 point)

A pipe is to be installed to connect two water towers, located at Points A and B. The distance from Point C to the tower at Point A is 1.2 miles, while the distance from Point C to the tower at Point B is 1.8 miles. If  $m\angle ACB$  is  $81^\circ$ , what is the distance, to the nearest tenth of a mile, between the water towers?

- ☐ a 2.2
- ☐ b 2.0
- ☐ c 1.8
- ☐ d 1.5

**Question 13** (1 point)

Which function is represented by the graph?



☐ a

$$f(x) = \begin{cases} x-3, & \text{if } x \leq 0 \\ -\frac{1}{2}x+1, & \text{if } x > 0 \end{cases}$$

☐ b

$$f(x) = \begin{cases} -x-3, & \text{if } x \leq 0 \\ \frac{1}{2}x+1, & \text{if } x > 0 \end{cases}$$

☐ c

$$f(x) = \begin{cases} -x+3, & \text{if } x \leq 0 \\ \frac{1}{2}x+1, & \text{if } x > 0 \end{cases}$$

☐ d

$$f(x) = \begin{cases} x+3, & \text{if } x \leq 0 \\ -\frac{1}{2}x+1, & \text{if } x > 0 \end{cases}$$

A Ferris wheel at the local fair has a diameter of 30 feet and a midline of 18 feet. This Ferris wheel makes one revolution every 60 seconds. If Amanda and Steve are riding on this Ferris wheel, which equation could be used to model,  $d$ , the distance Amanda and Steve are from the ground as they ride the Ferris wheel as a function of time,  $t$ ?

☐ a

$$d(t) = 15 + 18 \sin\left(\frac{\pi t}{30}\right)$$

☐ b

$$d(t) = 15 + 18 \sin\left(\frac{30t}{\pi}\right)$$

☐ c

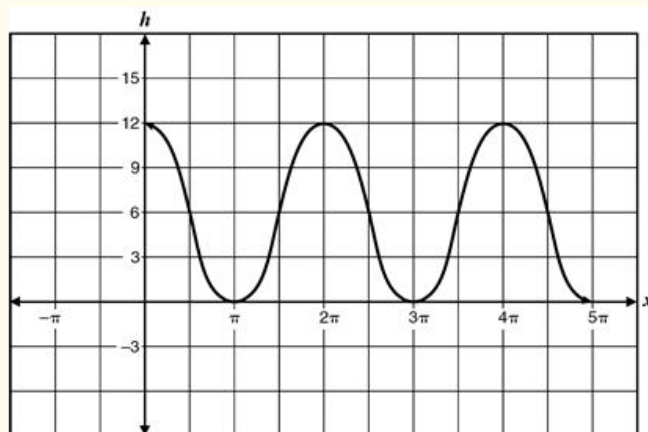
$$d(t) = 18 + 15 \sin\left(\frac{\pi t}{30}\right)$$

☐ d

$$d(t) = 18 + 15 \sin\left(\frac{30t}{\pi}\right)$$

Question 15 (1 point)

A mark of T is at the top of a small wheel. The graph shows  $h$ , the height in centimeters of the T above the ground as a function of  $x$ , the angle the wheel has turned.



Which function is best represented by the graph?

☐ a

$$h(x) = 6 \sin\left(x + \frac{\pi}{2}\right) + 6$$

☐ b

$$h(x) = 6 \cos\left(x + \frac{\pi}{2}\right) + 6$$

☐ c

$$h(x) = 12 \sin\left(x - \frac{x}{2}\right)$$

☐ d

$$h(x) = 12 \cos x$$

**Question 16** (1 point)

Evaluate the logarithm function.

$$\log_4(x - 3) + \log_4(x + 3) = 2$$

- ☐ a  $x = \pm 5$
  - ☐ b  $x = -5$
  - ☐ c  $x = \sqrt{11}$
  - ☐ d  $x = 5$
- 

**Question 17** (1 point)

In a particular city, 82% of the residents have a desktop computer, 47% have a desktop and a laptop computer, and 3% have neither a desktop nor a laptop computer. What is the probability that this home does not have a laptop computer given that the randomly selected home has a desktop computer?

- ☐ a 0.43
  - ☐ b 0.55
  - ☐ c 0.51
  - ☐ d 0.28
- 

**Question 18** (1 point)

What is the x-intercept of the function?

$$y = \log(x + 3) - 6$$

- ☐ a 216
  - ☐ b 60466173
  - ☐ c 729
  - ☐ d 999997
- 

**Question 19** (1 point)

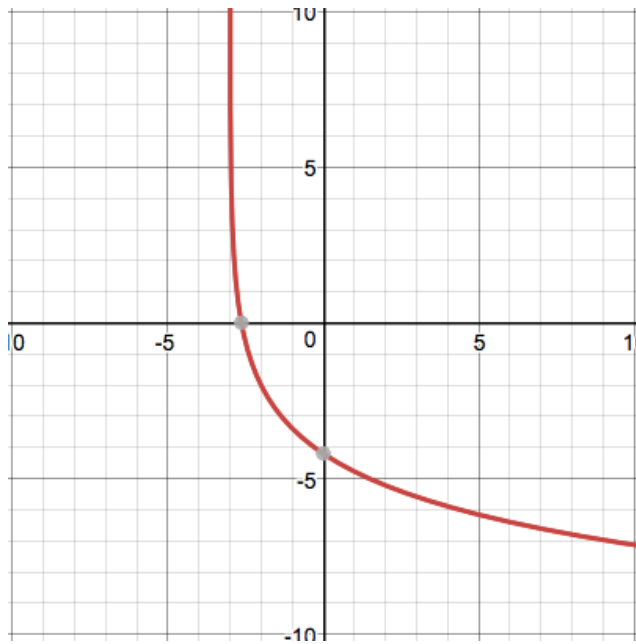
The Rodriguez family plans to build a pyramid of firewood for use in the fireplace. At the very top of the pyramid (the first row), they have only one piece of wood. In the next row, they have three pieces of wood and they continue by placing two more pieces of wood in each succeeding row. If each piece of wood is \$1.50, which explicit function expresses the cost,  $C(n)$ , of the firewood as a function of the number of rows in the pyramid,  $n$ ?

- ☐ a  $C(n) = 2n - 1$
  - ☐ b  $C(n) = 1.50n^2$
  - ☐ c  $C(n) = 1.50(2n - 1)$
  - ☐ d  $C(n) = n^2$
- 

**Question 20** (1 point)

Which function matches the graph.





- ☐ a  $y = -2\ln(x - 3) - 2$
- ☐ b  $y = -2\ln(x + 3) - 2$
- ☐ c  $y = 2\ln(x + 3) - 2$
- ☐ d  $y = -2\ln(x - 3) + 2$

**Question 21** (1 point)

The equation  $y = 4.5x^{1/5}$  is graphed on the coordinate plane. How does decreasing the coefficient of the function transform the graph?

- ☐ a The graph of the function becomes narrower along the y-axis.
- ☐ b The graph of the function becomes wider along the x-axis.
- ☐ c The graph of the function becomes narrower along the x-axis.
- ☐ d The graph of the function becomes wider along the y-axis.

**Question 22** (1 point)

A math test has 12 multiple choice questions with five choices containing one correct answer each. If you randomly guess on each of the 12 questions, what is the probability that you get exactly eight questions correct?

- ☐ a 0.12085
- ☐ b 0.000519
- ☐ c 0.13287
- ☐ d 20.9279

**Question 23** (1 point)

There are six men and seven women in a ballroom dancing class. How many ways can four men and four women be chosen?

- ☐ a 302,400
- ☐ b 1,287
- ☐ c 525

☐ d 5,1891,840

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**Question 24** (1 point)

You pay \$10 to play the following game of chance. There is a bag containing 12 balls, five are red, three are green and the rest are yellow. You are to draw one ball from the bag. You will win \$14 if you draw a red ball and you will win \$12 if you draw a yellow ball. How much do you expect to win or loss if you play this game 100 times?

- ☐ a \$167  
☐ b \$667  
☐ c \$917  
☐ d \$-83
- 

**Question 25** (1 point)

A grab bag contains 12 packages worth 80 cents apiece, 15 packages worth 40 cents apiece and 25 packages worth 30 cents apiece. If you pay 50 cents to pick a package, what is the expected value of picking one package at random?

- ☐ a \$-0.87  
☐ b \$44.42  
☐ c \$-5.58  
☐ d \$0.57
- 

**Question 26** (1 point)

In a junior football league, 55% of the players come from Western Canada, and 45% are from the Eastern Canada. From this league, 17% of the Western players and 11% of the Eastern players will go on to the CFL. If a randomly chosen CFL player who came from the junior league is selected, what is the probability a player came from Eastern Canada?

- ☐ a  $\frac{4}{19}$   
☐ b  $\frac{99}{2000}$   
☐ c  $\frac{5}{6}$   
☐ d  $\frac{9}{26}$
- 

**Question 27** (1 point)

Twelve people are randomly selected from a group of eighteen men and fifteen women to form a committee. How many ways can you choose a committee of exactly 9 men?

- ☐ a 220
  - ☐ b 22122100
  - ☐ c 354817320
  - ☐ d 48620
- 

**Question 28** (1 point)

An 8 digit PIN number can begin with any digit (except zero) and the remaining digits have no restriction. What is the probability of the PIN code beginning with a 6 and ending with an 5, if repeated digits are allowed?

- ☐ a  $\frac{177}{10000}$
  - ☐ b  $\frac{1}{30}$
  - ☐ c  $\frac{59}{100000}$
  - ☐ d  $\frac{1}{900}$
- 

**Question 29** (1 point)

Find the sum of the arithmetic series in which  $a_1 = 5$  and  $a_{34} = 71$

- ☐ a 1292
  - ☐ b 6.3
  - ☐ c 1122
  - ☐ d 355
- 

**Question 30** (1 point)

Mrs. Thompson, a member of Lee High School's Parent Teacher Association, wants to determine the average amount of money that high school students across the nation spend each day on lunch. Which method would be most likely to provide the most accurate answer?

- ☐ a Choose one student from Lee High School and ask how much he or she spends on lunch today.
- ☐ b Collect a sample group of high school students from different parts of the nation using social media, and calculate the average cost of their school lunches.
- ☐ c Divide the amount of money collected in the Lee High School cafeteria today by the number of students in attendance.
- ☐ d Find the amount spent on school lunches by the federal government in 2009 and then divide by the number of students enrolled in high school in 2009

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