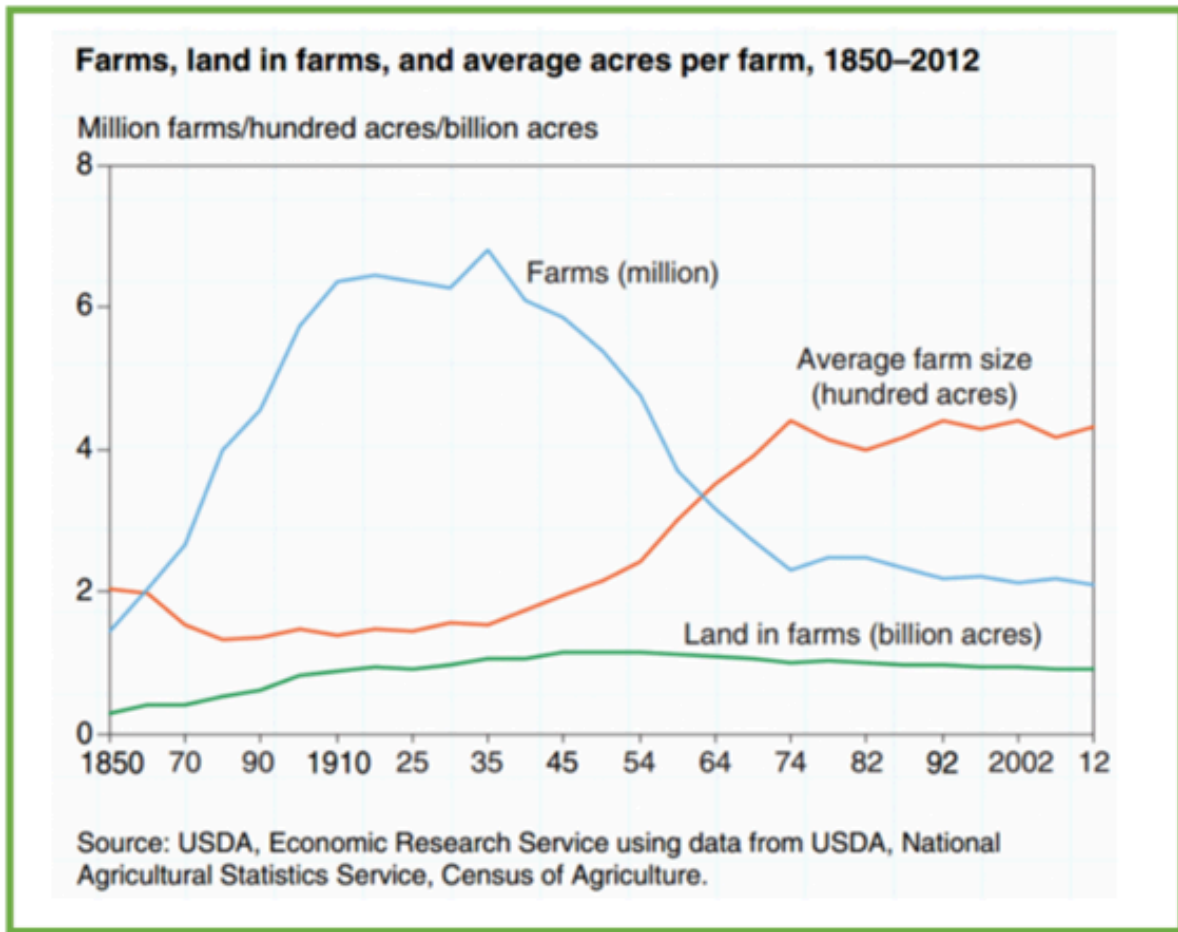**Name:** _____

Class #: _____

Instructor: Jared Grimmer

Class: Math for the Real World: Section A4 (SP24)

Section #: _____

Assignment: Unit 2 Review

Question 1: (1 point)

The figure below shows number of farms, amount of land used by farms, and average farm size in the United States from 1850 to 2012. Which of the following conclusions would be most correct to draw from this chart?

Farms, land in farms, and average acres per farm, 1850–2012

Million farms/hundred acres/billion acres

Farms (million)

Average farm size (hundred acres)

Land in farms (billion acres)

Source: USDA, Economic Research Service using data from USDA, National Agricultural Statistics Service, Census of Agriculture.

(a) The United States will soon face a crisis because there are not enough farms to support the population

(b) The return of soldiers from World War II in the mid-1940s led to massive consolidation of farms in the United States.

(c) The growth in average farm size has led to more and more land used for farming.

(d) Farms have been dramatically growing in size over the last fifty years.

(e) Compared to the mid-1900s, farms today are significantly larger on average, and there are fewer of them, but the amount of land used for farming hasn't really changed much.

Question 2: (1 point)

Which of the following tables represents a function?

Table 1		Table 2		Table 3	
x (input)	y (output)	x (input)	y (output)	x (input)	y (output)
0	0	11	0	0	0
1	0	11	1	-1	-1
2	0	11	2	-13	-13

(a) Table 1 and Table 3 both represent functions but Table 2 does not represent a function.

(b) None of the Tables represent functions.

(c) Only Table 2 represents a function.

(d) Only Table 3 represents a function.

(e) Table 1 and Table 2 both represent functions but Table 3 does not represent a function.

Question 3: (1 point)

James wants to show the percentage of voters that belong to each of the political parties in his home state of New York.

Which of the following charts or graphs would be most appropriate to display this information?

(a) Time Series

(b) A graph would not be appropriate for this data.

**(c)** Pie Chart

(d) Bar Chart

(e) Scatterplot

Mary wants to show the populations of the five most populous states.

Which of the following charts or graphs would be most appropriate to represent this information?

(a) Bar Chart

(b) Scatter Plot

(c) Time Series

(d) Pie Chart

(e) A graph would not be appropriate for this data


Question 5: (1 point)

The following graph shows the number of trick-or-treaters at a house in Rexburg between 2007 and 2016.
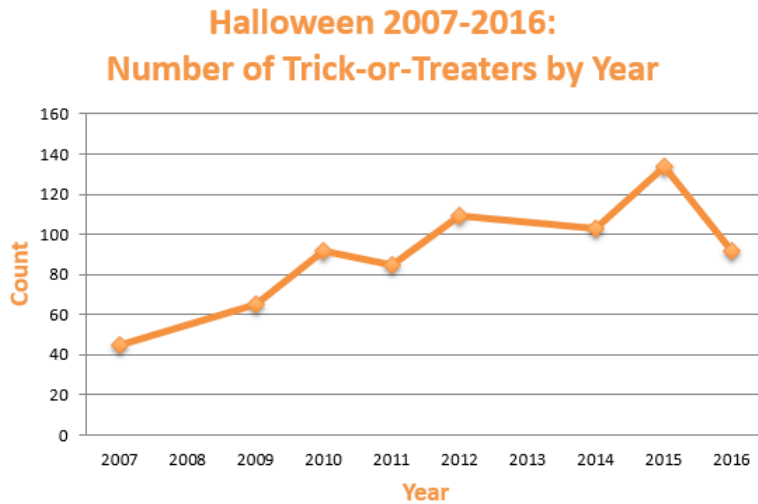
Which of the following best describes the information portrayed in this graph?

(a) Generally, the number of trick-or-treaters has been decreasing over time.

(b) There were more trick-or treaters in 2016 than in any other year.

(c) Generally, the number of trick-or-treaters has been increasing over time.

(d) There were fewer trick-or-treaters in 2016 than in any other year.

(e) Generally, the number of trick-or-treaters has been fairly consistent.

Question 6: (1 point)

SCHOOL LUNCH PARTICIPATION
NATIONWIDE (SOURCE: SCHOOLNUTRITION.ORG)
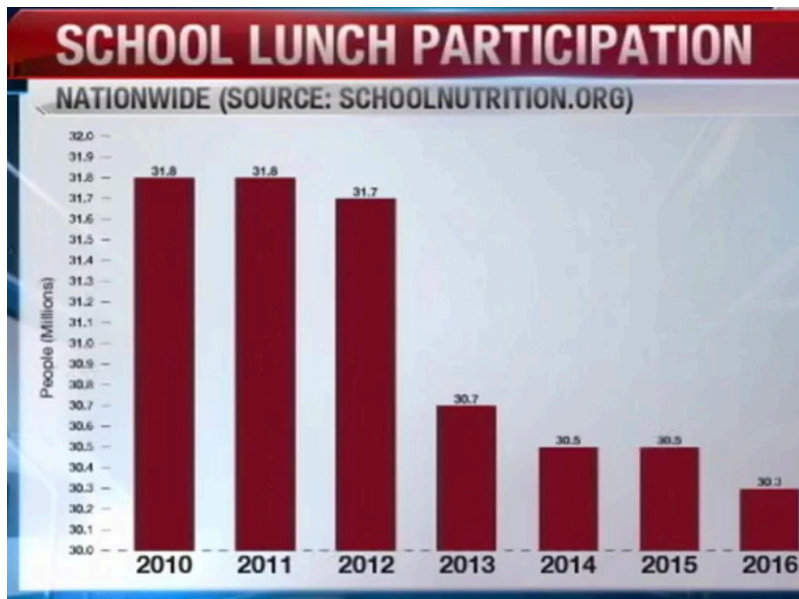
Which of the following best describes why this graph could be misleading?

(a) The data comes from too small of a sample.

(b) The vertical axis (y-axis) does not start at zero.

(c) A bar chart is not an appropriate graph for this data. They should have made a pie chart.

(d) The source of the data is very questionable.

(e) The graph has an alternative explanation flaw in logical reasoning.

The following scripture includes a "function" sentence.

"There is a law irrevocably decreed in heaven before the foundations of this world, upon which all blessings are predicated---And when we obtain any blessing from God, it is by obedience to that law upon which it is predicated." (D&C 130:20-21)

Which of the following correctly identifies the inputs and outputs of this function?

     (a) Input: obedience; Output: blessings

     (b) Inputs: obtain blessings; Output: obedience to the law

     (c) Inputs: blessings and obedience; Output: law

     (d) Inputs: obedience and law; Output; blessings

     (e) Input: blessings; Output: law

Question 8: (1 point)

The temperature in degrees Fahrenheit is a function of the temperature in degrees Celsius (x). The following function can be used to find the temperature in Fahrenheit if we are given the temperature in Celsius:

$$f(x) = \frac{9}{5}x + 32$$

If it is 9 degrees Celsius, what is the temperature in degrees Fahrenheit? (Round to the nearest whole degree)

     (a) 46

     (b) 48

     (c) 23

     (d) 20

     (e) 37

The temperature in degrees Fahrenheit is a function of the temperature in degrees Celsius (x). The following function can be used to find the temperature in Fahrenheit if we are given the temperature in Celsius.

$$f(x) = \frac{9}{5}x + 32$$

Which of the following is the correct interpretation of the **slope** of this linear equation?

    (a) The temperature in Fahrenheit is 9/5 of the temperature in Celsius.

    (b) The temperature in Celsius is 32 degrees more than the temperature in Fahrenheit.

    (c) The temperature increases by 5 degrees Fahrenheit for an increase of 9 degrees Celsius.

    (d) If the temperature in Celsius is 0 degree, the temperature in Fahrenheit is 32 degrees.

    (e) The temperature increases by 9 degrees Fahrenheit for an increase of 5 degrees Celsius.

Question 10: (1 point)

Which of the following is the most correct definition of a function?

    (a) A function is a rule that assigns the input value to multiple output values.

    (b) A function is a mathematical process used to graph exponential functions.

    (c) A function is a process whereby an action is completed.

    (d) A function is a mathematical process used to graph quadratic functions.

    (e) A function is a rule that assigns the input value(s) to a single output value.

Consider the following sentence:

"Your monthly cash flow is a function of your income and expenses"

Which of the following correctly identifies the input(s) and output(s) of this function?

    (a) Inputs: income and expenses; Output: monthly cash flow

    (b) Input: monthly cash flow; Outputs: income and expenses

    (c) Input: monthly cash flow; Output: income

    (d) Input: monthly cash flow; Output: expenses

    (e) Input: expenses; Output: income

Question 12: (1 point)

Given the function $d\,(p) = 3\,p^2 - 20\,p - 110$, what is $d(5)$?

_____

Consider the following function:

$$A(P, r, n, t) = P\left(1 + \frac{r}{n}\right)^{nt}$$

where the variables have the following meaning:

A = amount accumulated

P = principal

r = interest rate

n = compoundings per period

t = number of periods

Find the value of the function when $P = 400$, $r = 5.5\%$, $n = 12$, and $t = 11$.
(Round your answer to the nearest whole number.)

_____

Question 14: (1 point)

We know the following two commands in Excel:

PMT(rate, nper, PV, FV)

FV(rate, nper, pmt, PV)

Which of the following Excel commands gives the monthly payment on a house that cost $225,000 with a down payment of $20,050. The loan was a conventional 15-year loan with an annual interest rate of 5.4%.

     (a) =PMT(0.054/12,180,-204950,0)

     (b) =FV(5.4/12,180,-20050,-225000)

     (c) =PMT(5.4/12,180,0,-204950)

     (d) =PMT(0.054/12,15,-225000,-20050)

     (e) =FV(0.054/12,15,-225000,-20050)

Question 15: (1 point)

In our readings, we studied Craig's decision to buy a car. Craig knows the following two Excel commands that he used during the Quantitative Reasoning Process:

PMT(rate, nper, PV, FV)

FV(rate, nper, pmt, PV)

In step3 of the Quantitative Reasoning Process, quantitative tools, Craig used the following command in Excel:

　　=PMT(0.04/12, 7*12, -5000, 0)

The Excel output for this command was **$68.34**. Which of the following best describes what this output represents?

　　(a) If Craig saves $68.34 per month in an account paying 4% interest he will be able to buy a $5000 car in 7 years.

　　(b) The monthly payment on a car loan of $5000, with an interest rate of 0.04% for 84 months, will be $68.34.

　　(c) The monthly payment on a car loan of $5000 with an interest rate of 4% for 7 years will be $68.34.

　　(d) If Craig saves $405.85 per year in an account paying 0.04% interest he will be able to buy a $5000 car in 84 years.

　　(e) The monthly payment on a car loan of $5000, with an interest rate of 0.33% for 7 years, will be $68.34 times 12 (or $820.08 per month).

Question 16: (1 point)

Marie knows the following two commands in Excel:

PMT(rate, nper, PV, FV)

FV(rate, nper, pmt, PV)

Marie is using the Quantitative Reasoning Process to make a plan to save money for her first car. She has $950 saved so far and plans to save $200 per month for the next 2 years. If she can save with an annual interest rate of 3%, which of the following commands will give Marie the final balance after 2 years?

　　(a) =PMT(3/12,2*12,-950,-200)

　　(b) =FV(0.03/12,2*12,-200,-950)

　　(c) =PMT(0.03/12,2,-950,-200)

　　(d) =FV(0.03/12,2*12,-200,0)

　　(e) =FV(3,2,-950,0)

Question 17: (1 point)

Vance is using the Quantitative Reasoning Process to create a plan to save for his children's education. He knows the following two commands in Excel:

PMT(rate, nper, PV, FV)

FV(rate, nper, pmt, PV)

Vance creates a plan to save $90 dollars a month for the next 19 years in an account with an annual interest rate of 1.7%. Which of the following excel commands will give Vance the account balance at the end of 19 years?

      (a) =FV(1.7/12,19*12,0,-90*4)

      (b) =FV(0.017/12,19*12,-90*4,0)

      (c) =FV(1.7/12,19,-90, 0)

      (d) =FV(0.017/12,19,0,-90)

      (e) =FV(0.017/12,228,-90,0)

Question 18: (1 point)

Simplify the following expression:

$$(2+2)^3 + 12 - 4 \div 4$$

      (a) 12

      (b) 75

      (c) 27

      (d) 66

      (e) 63

Rewrite the following equation as a function of x;

$$4x - 7y + 14 = 0$$

(a) $f(x) = \dfrac{4x}{7} - 14$

(b) $f(x) = -4x + \dfrac{14}{7}$

(c) $f(x) = \dfrac{(4x + 14)}{-7}$

(d) $f(x) = \dfrac{(4x + 14)}{7}$

(e) $f(x) = \dfrac{(7y - 14)}{4}$

Question 20: (1 point)

Rewrite the following equation as a function of x:

$$8x - 2y = 13$$

(a) $f(x) = \dfrac{8x - 13}{2}$

(b) $f(x) = -4x + 13$

(c) $f(x) = -\dfrac{5}{2x}$

(d) $f(x) = \dfrac{13}{x} - 8$

(e) $f(x) = 8x + 13$

Solve the following expression for P:

$$A = P\left(1 + \frac{r}{n}\right)^{ny}$$

(a) $P = A - \left(\frac{r}{n}\right)^{ny}$

(b) $P = A - \left(1 + \frac{r}{n}\right)^{-ny}$

(c) $P = A\left(1 + \frac{r}{n}\right)^{-ny}$

(d) $P = A\left(1 + \frac{r}{n}\right)^{ny}$

(e) $P = A\left(-\frac{r}{n}\right)^{ny}$

Question 22: (1 point)

Given the function $f(x) = -7x + 9$, find $f(-7)$.

(a) -7

(b) -70

(c) 56

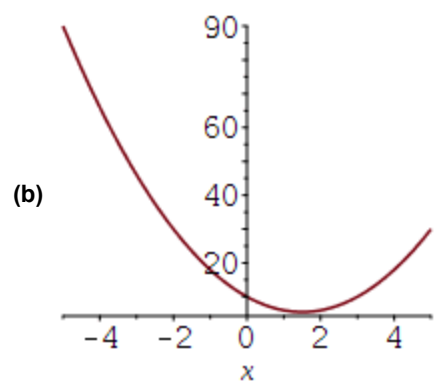(d) 40

(e) 58

Given the function $f(x) = 2500\,[1.15]^x + 160$, find $f(20)$.

(a) 57,660

(b) 40756.3
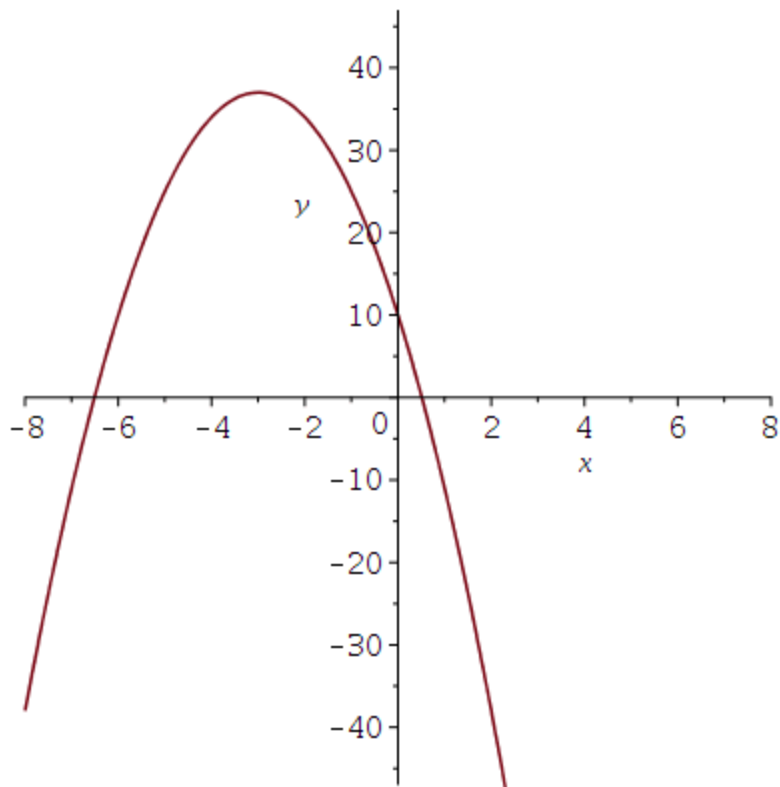
(c) 41076.3

(d) 57,340

(e) 40916.3

Which of the following is the correct graph of $f(x) = 2x^2 + 8x - 2$?

(a)

(b)

(c)

(d)
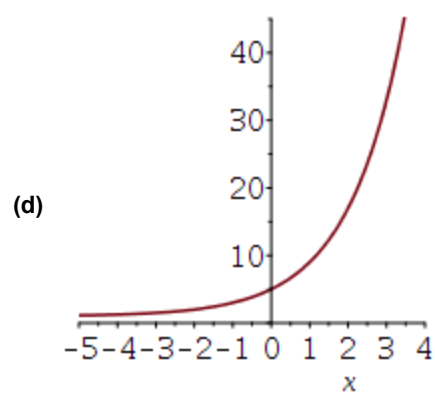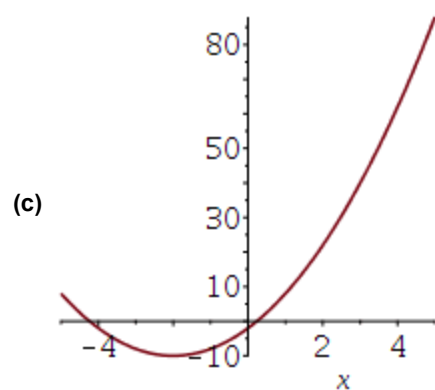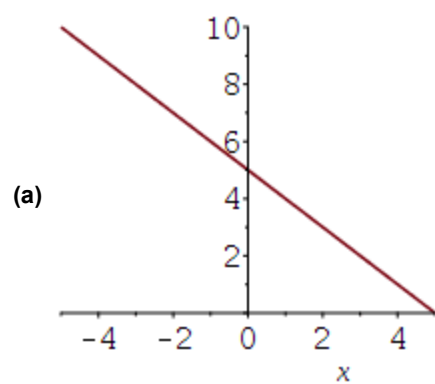
(e)
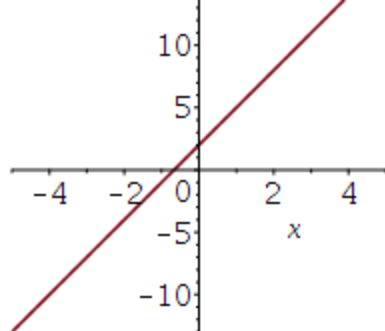
Identify the correct function from the graph shown.

(a) $y = 3x^2 - 18x - 10$

(b) $y = -3x^2 - 18x - 10$

(c) $y = 3x^2 + 18x + 10$

(d) $y = -3x^2 + 18x + 10$

(e) $y = -3x^2 - 18x + 10$

Which of the following is an exponential function?

(a) $f(x) = 7 + x$

(b) $f(x) = -x^2 + 1$

(c) $f(x) = 2x + 1$

(d) $f(x) = -9^x + 3$

(e) $f(x) = (2 + x)/(x)$

Question 27: (1 point)

Which of the following is a quadratic function?

(a) $f(x) = 6 + 2x$

(b) $f(x) = -x^2 + 4$

(c) $f(x) = 2^x + 1$

(d) $f(x) = 3x - 7$

(e) $f(x) = \dfrac{1}{x^2 - 1}$

Which of the following is an exponential function?

(a) $f(x) = 9 - x$

(b) $f(x) = -5 \cdot 3^x + 1$

(c) $f(x) = 2x + 1$

(d) $f(x) = 3\sqrt{x} + 3$

(e) $f(x) = x^2 - 5x + 2$

Question 29: (1 point)

Find the vertex of the parabola:

$f(x) = 2x^2 - 32x + 10$

(a) $(8, -118)$

(b) $(-8, 394)$

(c) $(8, 10)$

(d) $(-8, 10)$

(e) $(-32, 3082)$

Question 30: (1 point)

Find the horizontal asymptote of the following exponential function:

$$f(x) = -5(3)^x - 7$$

$y = $_____

We learned that Galileo developed the equation $f(x) = -16x^2 + v_0 x + h$ to show the path of a free-falling object:

- x represents time
- v_0 represents the initial velocity of the object
- h represents the initial height of the object (in feet)
- The input of the function (x) represents how long the object has been in the air
- the output of the function is the final height of the object above the ground

Ramzen stood on a rope bridge over a deep cavern and wondered how high the bridge was above the water. He dropped a rock and it took 3 seconds to hit the water. When he arrived safely back home he wanted to tell people how high the bridge was, so he used Galileo's equation to estimate the height of the bridge by figuring that when he dropped the stone it had no initial velocity, but gained speed as it fell for the 3 seconds to hit the water which he figured was a height of 0. Substituting these figures into Galileo's equation gave him $0 = -16(3)^2 + h$. Solving for h he estimated the height of the bridge was:

(a) 1.78 feet

(b) .562 feet

(c) 90 feet

(d) 144 feet

(e) 432 feet

Dave and Emily are both saving the same amount each month for retirement, but Emily started when she was 25 years old and Dave waited until he was 35 years old to begin his savings plan. The graph displays the exponential function of each investment plan. Which statement provides the best explanation of the difference between Dave and Emily's savings plan.

Starting Saving at 25 vs. 35
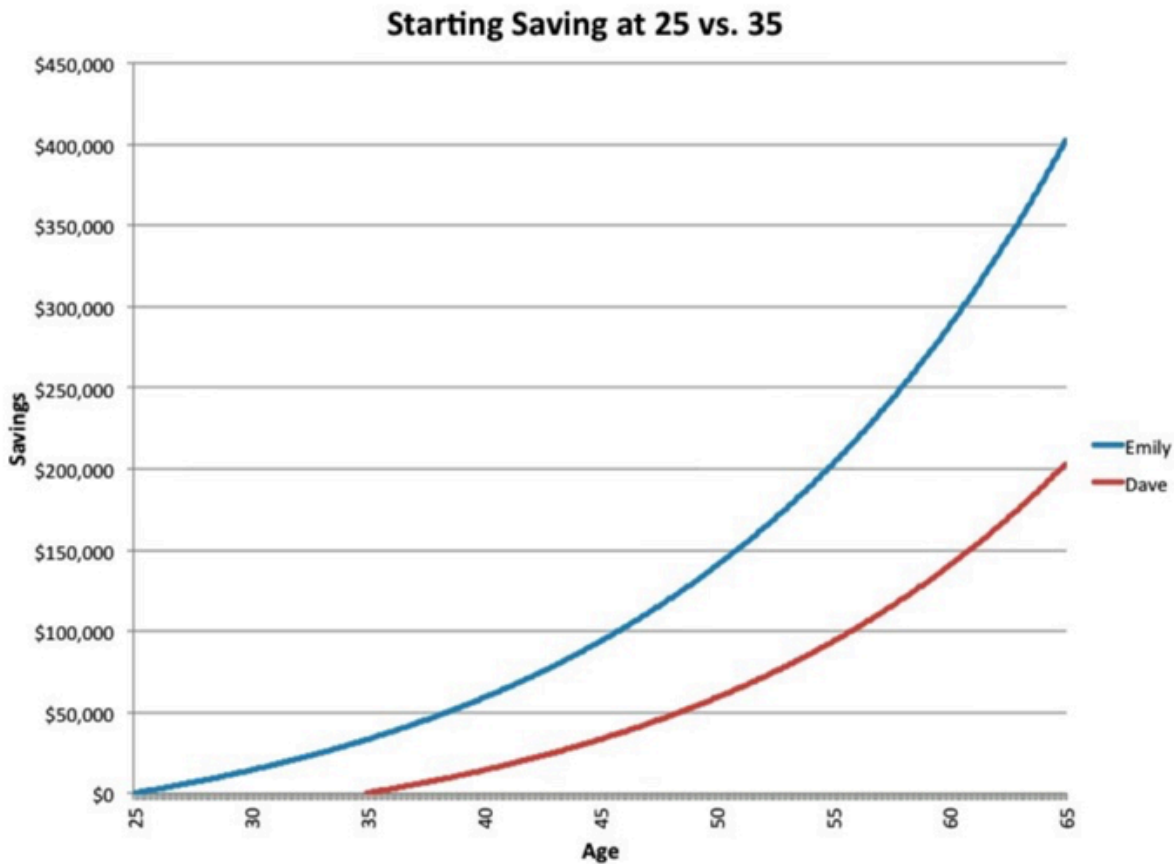
(a) By starting her savings earlier Emily will have approximately twice as much money as Dave at age 65 even though they both have the same growth rate.

(b) Emily's growth is exponential but Dave's growth is more linear.

(c) Dave's savings plan has a much higher growth rate than Emily's plan.

(d) By starting his plan later, Dave will have twice as much as Emily at age 65 even though Emily has a higher growth rate.

(e) Emily's savings plan has a much higher growth rate than Dave's plan.

Alissa used the Quantitative Reasoning Process to create a plan to pay off her car loan of $8,880. The interest rate on her loan is 3.575% annually and she plans to make monthly payments of $161.84 for 5 years. Complete month 1 of the amortization table below. What is the **Ending Balance** for Month 1?

Month	Beginning Balance	Payment: To Interest	Payment: To Principal	Ending Balance
1				??
2				
3				

(a) $8880.

(b) $8744.62

(c) $8718.16

(d) $8853.54

(e) $9035.62

Question 34: (1 point)

Tyson used the Quantitative Reasoning Process to create a plan to pay off his student loans of $2,760. The interest rate on his loan is 2.7% annually and he plans to make monthly payments of $26.27 for 10 years. Complete months 1 and 2 of the amortization table below.

How much of Tyson's payment goes to **Interest** in Month 2?

Month	Beginning Balance	Payment: To Interest	Payment: To Principal	Ending Balance
1				
2		??		
3				

(Round your FINAL answer to the nearest cent.)

$_____

In the graph below, which point represents the greatest rate of change of the function?
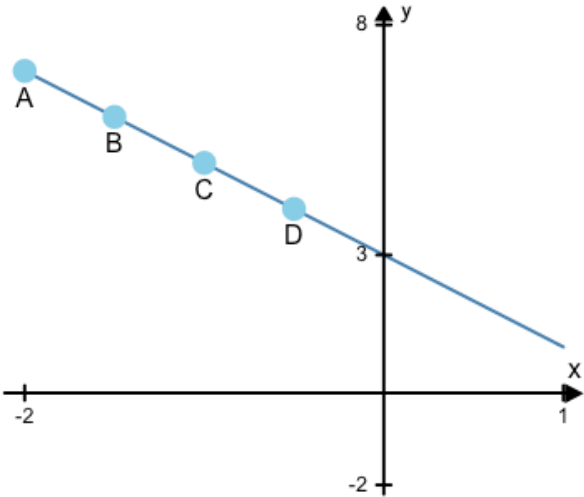
Point A

[ ]

Point B

[ ]

Point C

[ ]

Point D

[ ]

All points shown have equal rates of change

[ ]

Which point below marks the place where the exponential function has a rate of change equal to the constant rate of change of the line?
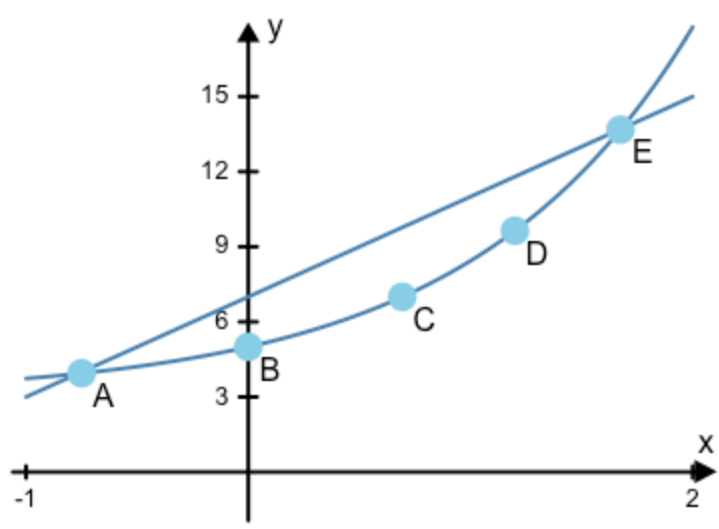
Point A

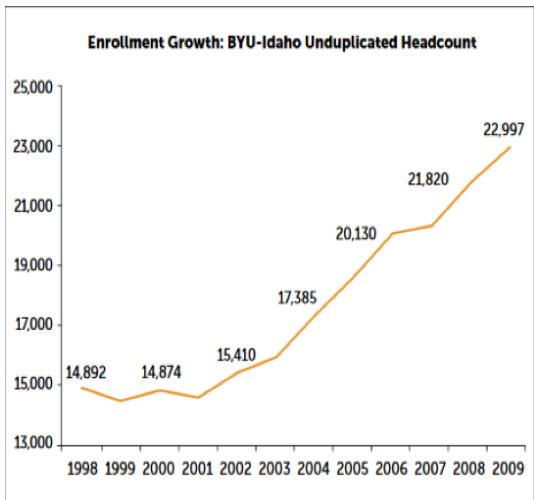[ ]

Point B

[ ]

Point C

[ ]

Point D

[ ]

Point E

[ ]

Which of the following situations represents a **variable** rate of change?

(a) Cassandra invested $2000 in a savings account that earns 2.1% compound interest per year.

(b) Orrin ran a 5K race with an average pace of 7 minutes per mile.

(c) Over a 10-year period, the number of children in the Olsen family increased by 1 child every 2 years.

(d) Chantal works at BYUI and has a starting pay of $11.85. Each semester that she works, she will earn a 10-cent raise.

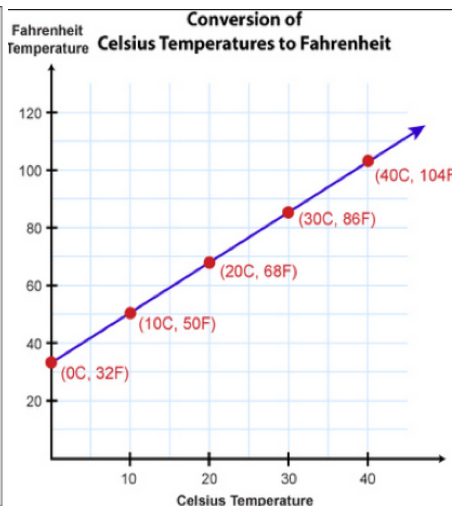(e) James saved $100 a month for one year in order to purchase a new TV with cash.

Question 38: (1 point)

Consider the following two graphs:

Graph A:

Enrollment Growth: BYU-Idaho Unduplicated Headcount

Graph B:

Conversion of Celsius Temperatures to Fahrenheit
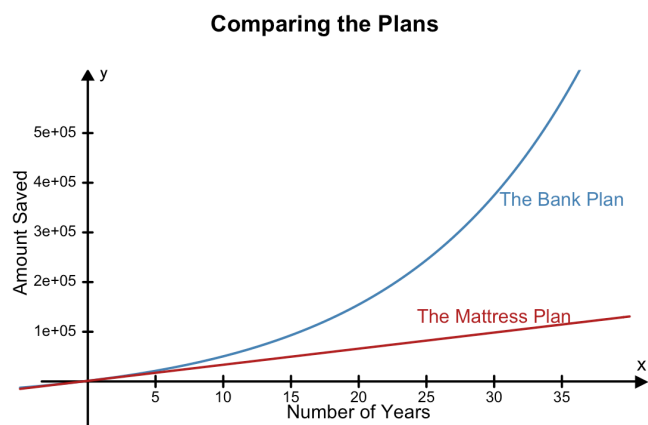
Which of the following statements is true?

(a) Both graphs represent variable rates of change.

(b) Both graphs represent constant rates of change.

(c) Graph A represents a variable rate of change and Graph B represents a constant rate of change.

(d) Graph A represents a constant rate of change and Graph B represents a variable rate of change.

(e) Neither of the graphs represent either variable or constant rates of change.

Question 39: (1 point)

Which of the following is the best definition of compound interest?

(a) Compound interest grows with a constant rate of change and is interest paid on loans, not interest earned on savings.

(b) Compound interest grows with a constant rate of change and is earned only on money you deposit and not on money you have earned in interest.

(c) Compound interest grows with a variable rate of change and is earned only on money market accounts, not on traditional savings accounts.

(d) Compound interest grows with a variable rate of change and is earned both on money you deposit and on money you have earned in interest.

(e) Compound interest grows with a variable rate of change and is interest earned on savings, not interest paid on loans.

In the reading we compared saving money in a bank and saving money under a mattress. In both situations, you started with the $1200 and saved $270 every month for 35 years. When you saved the money under your mattress you ended with $114,600 and when you saved the money in a savings account you ended with $564,736.46. The difference is shown in the following graph.

Comparing the Plans

Which of the following statements correctly describes why the balance of the bank account is higher than the amount under the mattress?

(a) The bank account started with a higher balance than the amount under the mattress.

(b) The bank account paid compound interest while the mattress plan earned no interest.

(c) We added money to the bank account every month, but didn't add additional money under the mattress.

(d) The amount in the bank was affected by strong growth of the stock market, while the mattress plan was unaffected by the stock market.

(e) The mattress plan showed a variable rate of change and the bank account showed a constant rate of change.