Directions: Unless otherwise specified, round all numeric values to three decimal places.

#1- # 4 Determine whether each table, graph, or equation represents *y* as a function of *x*. Circle the appropriate choice.

1.

x	0	1	2	3	3
y	4	8	2	6	7

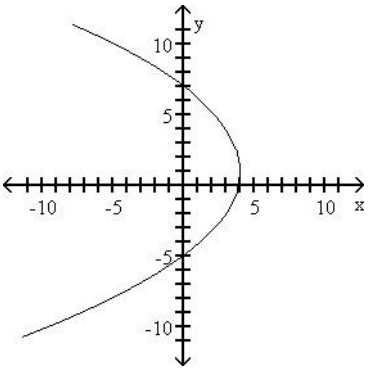
(A) *y* is a function of *x* (B) *y* is not a function of *x*

2.

x	-3	-2	0	1	2
y	3	3	3	3	3

(A) *y* is a function of *x* (B) *y* is not a function of *x*

3.

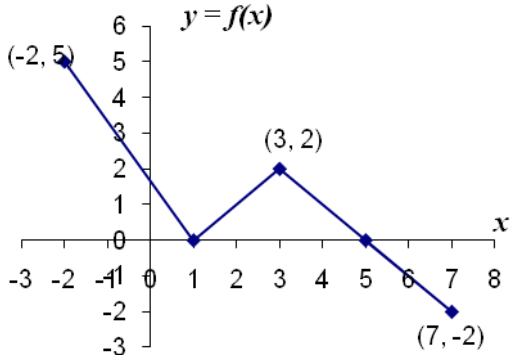


(A) *y* is a function of *x* (B) *y* is not a function of *x*

4. $y = 2x^3 + 5x + 7$

(A) *y* is a function of *x* (B) *y* is not a function of *x*

#5 - # 8 Refer to the following graph of $y = f(x)$.



5. Find the domain.
6. Find the range.
7. Find the interval over which the function is increasing.
8. Find the interval over which the function is decreasing.

9. The table below gives y as a function of x.

A) Complete the row for average rate of change.

x	-6	-3	0	2	5
y	-128	-62	4	48	114
$\frac{\Delta y}{\Delta x}$					---------- ----------

B) Based on the average rate of change found, is the function increasing or decreasing?

10. You are driving to visit your grandmother. You leave your house. For the first hour you are within the city limits and drive at a constant speed of 45 mph. You then reach the end of the city limits and increase your speed to 70 mph for the remaining two hours of your trip. Describe the distance (from your starting point) symbolically as a function, d*(t)*. Hint: think piece-wise function.

11. The population of Union City was 227 thousand in 2000 and was decreasing at an average rate of 23 thousand people per year.

A) Find a linear population model, P(t), that gives the population of Union City as a function of the number of years after 2000.
B) According to your model, what was the population of Union City in 2009?
C) Use your model to predict the year in which the population of Union City falls to 200 thousand.

12. The 1960 – 1990 population census data for a U. S. city is given by

Year	1960	1970	1980	1990
Population	439	584	790	1008

A) Find the exponential model $P(t) = ab^t$ with $t = 0$ in 1960 that best fits the census data.
B) What was the city's average annual rate of growth during this time period?
C) Using the model found in part A), predict the city's population in 2010.

13. Calculate the amount in an account after 4 years if $2,000 is initially invested at an annual interest rate of 6% compounded

A) Semiannually
B) Continuously

14. The table below gives y as a function of x.

x	10	20	30	40
y	30	90	270	1008

Determine whether these data are best suited for a linear, quadratic, exponential, or logarithmic model.

15. A crossbow propels an arrow upward from a tree stand. The height of the arrow (in feet) is given by the quadratic function, $h(t) = -16t^2 + 240t + 10$, where t is given in seconds.

A) How high is the tree stand?
B) How long does the arrow stay in the air (nearest tenth of a second)?
C) How high does the arrow go (nearest tenth of a foot)?

16. The following table gives the estimated life expectancy in the United States as a function of years after 1940.

t (years after 1940)	3	13	43	63
E (age)	63.3	68.8	74.6	77.5

A) Write a logarithmic model of the form $E(t) = a + b\ln t$ that best fits these data.
B) In what year does the model predict that the estimated life expectancy will be 80 years?
C) Find the average error for the model in part A).

Answers:

1. B
2. A
3. B
4. A
5. [-2, 7]
6. [-2, 5]
7. [1, 3]
8. $[-2,1] \cup [3,7]$
9. A) 22
   B) Increasing
10. $d(t) = \begin{cases} 45t, & 0 \le t \le 1 \\ 70(t-1)+45, & 1 < t \le 3 \end{cases}$
11. A) $P(t) = 227 - 23t$
    B) 20 thousand
    C) the year 2001
12. A) $P(t) = 439(1.022)^t$
    B) 2.2%
    C) 1757.993
13. A) $2533.54
    B) $2542.50
14. Exponential
15. A) 10 feet
    B) 15.0 seconds
    C) 910 feet
16. A) $P(t) = 57.835 + 4.569 \ln(t)$
    B) the year 2067
    C) 0.609