Practice Questions for MA 15300 Test 1

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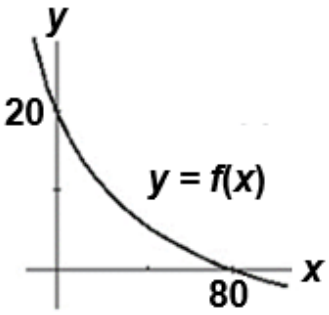
1) True or False:
Given that the point (5, 8) is on the graph of f is enough information to find the value of f(5).

2) Tuition cost T (in dollars) for part-time students at a college is given by $T = 300 + 200C$, where C represents the number of credits taken.

   a) Find the tuition cost for six credits.
   b) Find the tuition cost for six credits.
      Taking six credits costs $\$$_____
   c) How many credits were taken if the tuition was $2,100?
      $2,100 is the cost of taking _____credits.

3) Suppose $y = f(x)$ is given by the graph below. Use the graph to find complete the blanks.



   a) $f(0)$ = _____
   b) f^{-1}(_____) = 0
   c) $f^{-1}(0)$ = _____
   d) f(_____) = 0

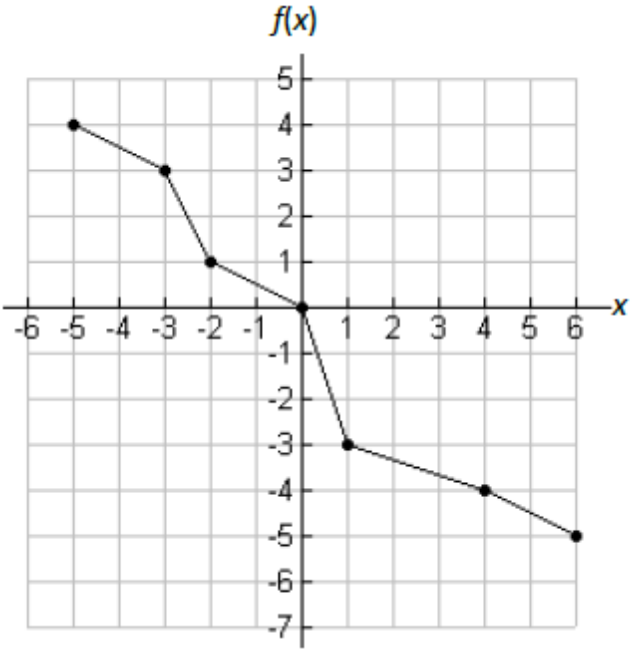
4) The table gives the amount of garbage, G, in tons, produced in a country in year t, so $G = f(t)$ since 1950.

***t*, years since 1950**	***G*, tons of garbage**
30	30
40	35
50	40
60	45

   a) Find $f(40)$ and interpret.
   b) Solve $f(t) = 40$ for t and interpret.
   c) Find the average rate of change of the function f from 1980 to 1990. **Report units in your answer**.
   d) Find a formula for $f(t)$ assuming the garbage increases at a steady rate.
   e) Interpret the slope of your formula in practical terms. Don't write RISE over RUN.
   f) Interpret the y-intercept of your formula in practical terms.
   g) Predict the amount of garbage in the year 2050, assuming this trend continues.

5) In 2006, the population of a town was 15,423 and growing by 200 people per year. Find a formula for *P,* the town's population, in terms of *t,* the number of years since 2006.

6) Explore the graph below and determine two intervals on which the average rate of change is the same.



Complete the blanks:
The average rate of change from *x* = _____ to *x* = _____ is the same value as
the average rate of change *x* = _____ to *x* = _____.

7) $f(x) = \frac{4x}{x^2+4}$. Evaluate f(−1).

8) $f(x) = \sqrt{16x + 4}$

a) Evaluate *f*(0).
b) Solve the equation *f*(*x*) = 0. Show work using algebra.
c) Sketch a graph of the function and label the points that correspond to what you found in a) and b)
d) Report the domain and range.

9) Find the domain and range of each of these functions.

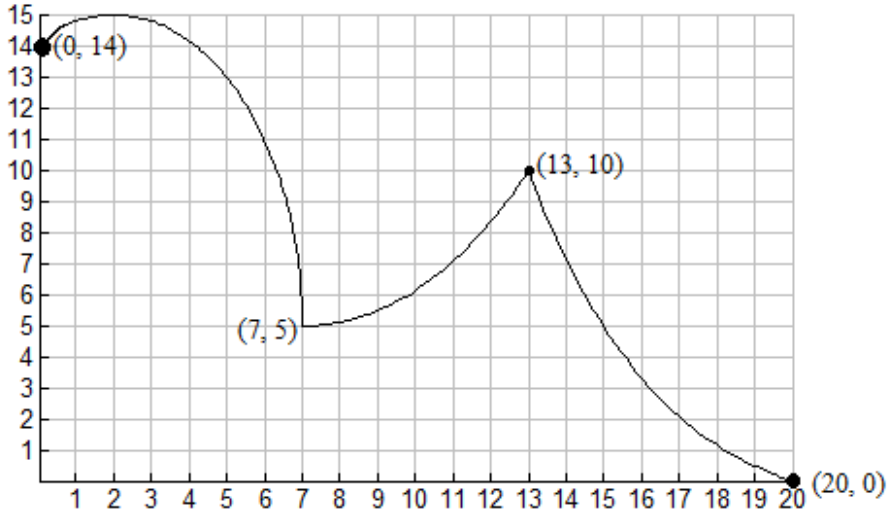
a) $f(x) = \frac{2}{x-3}$
b) $g(x) = \sqrt{x + 3}$
c) $h(x) = \sqrt{3 - x}$
d) $p(x) = \sqrt{x - 3}$
e) $q(x) = \frac{2}{(x-3)^2}$

10) The entire graph of $g(x)$ is shown.

Provide answers which are whole numbers.

a) What is the domain of g?
b) What is the range of g?
c) Report all values of x which solve the equation $g(x) = 8$.
d) Solve $g(x) \geq 8$. Express your answer using inequality or interval notation.
e) Solve $g(x) < 8$. Express your answer using inequality or interval notation.
f) For what values of x is the function increasing? ____ $< x <$ ____

11) The entire graph of $y = h(x)$ is shown.



Report on which open intervals of x is $h(x)$ the following.

a) concave down? ___ $< x <$ ___
b) increasing and concave down? ___ $< x <$ ___
c) increasing and concave up? ___ $< x <$ ___
d) decreasing and concave down? ___ $< x <$ ___
e) decreasing and concave up? ___ $< x <$ ___

12) You need to rent a car and compare the charges of three different companies.

- Company A charges 5 cents per mile plus 33 dollars per day.
- Company B charges 44 dollars per day with no mileage charge.
- Company C charges 15 cents per mile plus 31 dollars per day.

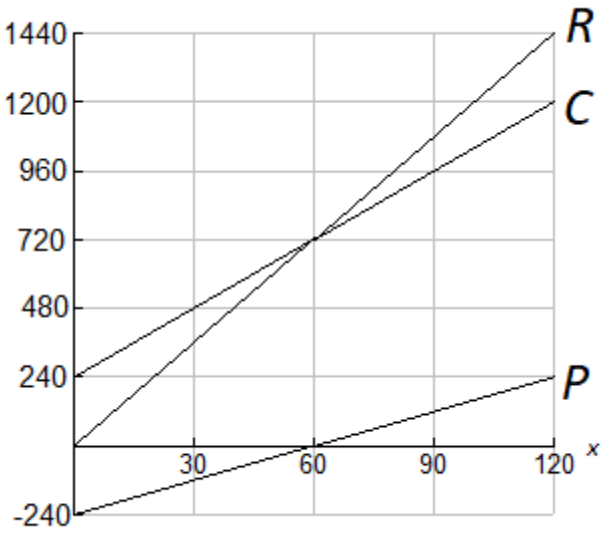
a) Find formulas for the cost of driving cars rented from companies A, B, and C, in terms of x, the distance driven in miles in one day.
b) Graph the costs for each company for $0 \le x \le 500$. Put all three graphs on the same set of axes. Use this graph to find under what circumstances company A is the cheapest. Find under what circumstances company B is the cheapest. Find under what circumstances company C is the cheapest.

13) You start 122 miles east of Pittsburgh and drive **west** at a constant speed of 43 miles per hour toward the town. (Assume that the road is straight and permits you to do this.) Find a formula for d, your distance east of Pittsburgh as a function of t, the number of hours of travel. (This model will be valid for values of d between 0 and 122 miles east of the town.)

14) In a college meal plan you pay a membership fee; then all your meals are at a fixed price per meal. Suppose 30 meals cost $265 and 60 meals cost $460.

a) Write a formula for the cost of a meal plan, C, in terms of the number of meals, n.
b) What is the price per meal?
c) What is the membership fee?

15) The revenue $R(x)$, cost $C(x)$, and profit $P(x)$ for a product are graphed in the figure below, where x is the quantity produced and sold. Note: $P(x) = R(x) - C(x)$.



a) Determine the number of items that must be sold to break even, i.e., revenue is equal to costs.The break-even quantity is _____ units sold.
b) Find the formulas of the three functions revenue $R(x)$, cost $C(x)$, and profit $P(x)$.

16) Given $f(x) = \frac{x}{x+8}$ and $g(x) = 4x - 3$, find $f(g(x))$ and simplify. Select **one**.

A. $f(g(x)) = \frac{4x}{x+8} - 3$ B. $f(g(x)) = \frac{4x-3}{4x+11}$ C. $f(g(x)) = \frac{4x-3}{4x+5}$

D. $f(g(x)) = \frac{-3}{11}$ E. $f(g(x)) = \frac{-3}{5}$ F. $f(g(x)) = \frac{x}{x+8} \cdot (4x - 3)$

G. None of these.

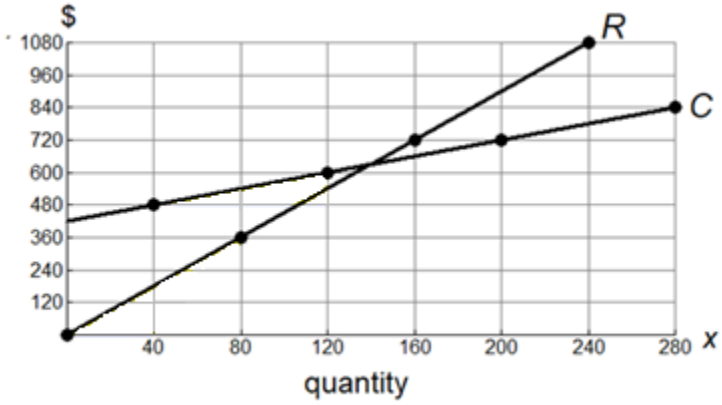
17) Given $f(x) = \frac{x}{\sqrt{x+2}}$ and $g(x) = x^2 - 1$, find $f(g(x))$ and simplify. Select **one**.

A. $f(g(x)) = \frac{x}{\sqrt{x+2}} - 1$ B. $f(g(x)) = \frac{x^2}{x+2} - 1$ C. $f(g(x)) = \frac{x^2-1}{\sqrt{x^2+3}}$

D. $f(g(x)) = \frac{x^2-1}{x+1}$ E. $f(g(x)) = \frac{x^2-1}{\sqrt{x^2+1}}$ F. $f(g(x)) = x - 1$

G. $f(g(x)) = -1$ H. None of these.

18) The graph below shows the revenue *R*(*x*) and cost *C*(*x*) functions for *x* units produced and sold.



a) Find and interpret the slope of *R.* Then give its formula.
b) Find and interpret the slope of *C.* Then give its formula.
c) Find and interpret the slope of the profit function *P.* Then give its formula. Hint: *P* = *R* – *C*.
d) Write and solve an equation to find the break-even quantity.

19) Scoop Dogg runs an Ice Cream Parlor in a small town in Alaska.

At a price of *p* = \$0.20 per scoop, q = 950 scoops per day are sold.
At a price of *p* = \$1.00 per scoop, *q* = 850 scoops per day are sold. Assume linearity.

a) Find a formula which gives *q* (quantity, in scoops) as a function of *p* (price, in dollars).
b) Find each. Include units.
   i. *f*(0) = _____
   ii. $f^{-1}(0)$ = _____
c) Interpret the meaning of your answer to part **bi**. in practical, real world terms.
d) Interpret the meaning of your answer to part **bii**. in practical, real world terms.
e) Use part b to complete the blanks:

   i. f^{-1}(_____) = 0
   ii. *f* (_____) = 0

f) Write a formula for *p* = $f^{-1}(q)$ which gives *p* in terms of *q*.

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