

Name: \_\_\_\_\_

Student ID: \_\_\_\_\_

Section: \_\_\_\_\_

Instructor: \_\_\_\_\_

# Math 1314 (College Algebra)

## Practice Exam 1

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Instructions:

- Work on scratch paper will not be graded.
- For questions 21 to 24, show all your work in the space provided. Full credit will be given only if the necessary work is shown justifying your answer.
- Please write neatly. If I cannot read your handwriting, you will not receive credit.
- Simplify your answers as much as possible. Expressions such as  $\ln(1)$ ,  $e^0$ ,  $\sin(\pi/2)$ , etc. must be simplified for full credit.

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**For Instructor use only.**

| #   | Possible | Earned |
|-----|----------|--------|
| MC  | 60       |        |
| 21  | 10       |        |
| 22  | 10       |        |
| Sub | 80       |        |
|     |          |        |

| #     | Possible | Earned |
|-------|----------|--------|
| 23    | 10       |        |
| 24    | 10       |        |
|       |          |        |
| Sub   | 20       |        |
| Total | 100      |        |

**Multiple Choice. Circle the correct answer for each question. Circle one choice only. Provide short answers for fill in the blank questions.**

1. Find the sum of the two solutions to the quadratic equation  $6x^2 + 17x + 5 = 0$ .

- a)  $-\frac{6}{5}$                       b)  $\frac{6}{5}$                       c)  $\frac{5}{6}$   
d)  $\frac{5}{17}$                       e)  $-\frac{17}{6}$                       f)  $\frac{17}{6}$

2. Suppose that  $b^2 - 4ac < 0$  for the equation  $ax^2 + bx + c = 0$ . Which of the following statement about the nature of the solutions to the equation is true?

- a) One real solution                      b) Two real solutions  
c) Two complex solutions                      d) No solutions

3. Solve the rational exponent equation  $(x - 1)^{\frac{3}{4}} = 8$  for  $x$ .

- a) 9                      b) 16                      c) 17  
d) 18                      e)  $4\sqrt[4]{2} + 1$                       f) 15

4. Find the sum of the two solutions of the equation  $|1 - 4x| - 1 = 5$ .

- a)  $-\frac{1}{2}$                       b)  $\frac{1}{2}$                       c)  $-\frac{5}{4}$   
d)  $\frac{5}{4}$                       e)  $\frac{7}{4}$                       f) 3

5. Let  $f(x) = \frac{x - 2}{x + 3}$ . Find  $f(-2)$ .

- a) -4                      b) -2                      c) 0  
d) 2                      e) 4                      f) Undefined

6. Let  $f(x) = 3x - 2$  and  $h(x) = -2x^2 + 3x - 1$ . Evaluate the expression  $f\left(\frac{7}{3}\right) - h(-2)$ .

- a) 20                      b) 10                      c) 6  
d) 4                      e) -10                      f) -20

7. True or False. A one-to-one function is a function in which each input value leads to exactly one output value.

- a) True                      b) False

8. True or False. The range of a relation is the set consisting of the second components of each ordered pair.

- a) True                      b) False

9. The graph of a function  $f$  is shown in Figure 1. Solve for  $f(x) = -3$ .

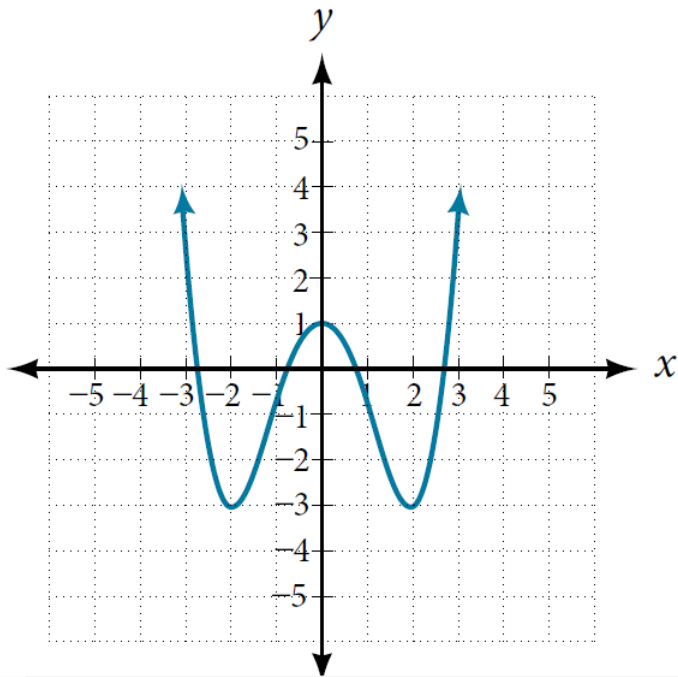


Figure 1: Figure for Question 9

- |            |            |            |
|------------|------------|------------|
| a) $-1, 1$ | b) $-2, 2$ | c) $-3, 3$ |
| d) $0$     | e) $2$     | f) $4$     |

10. Find the range of the function whose graph is shown in Figure 2.

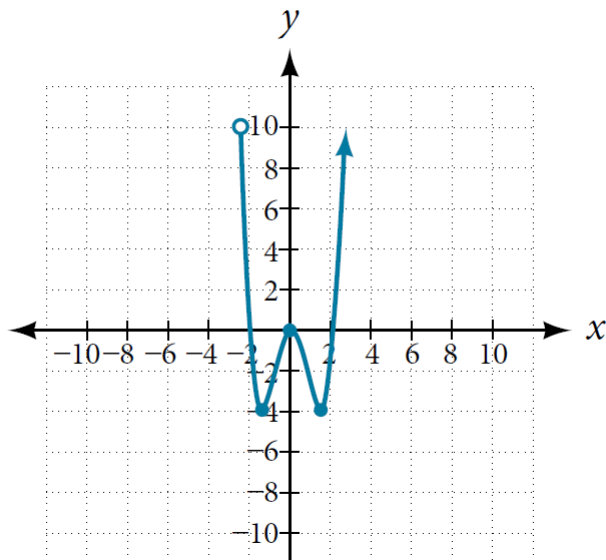


Figure 2: Figure for Question 10

- |               |                   |                   |
|---------------|-------------------|-------------------|
| a) $(-2, 2]$  | b) $[-2, 2]$      | c) $[-4, 10)$     |
| d) $(-4, 10]$ | e) $(-4, \infty)$ | f) $[-4, \infty)$ |

11. Find the domain of the function  $f(x) = \frac{x-3}{x^2+9x-22}$ .

- a)  $(-\infty, 3) \cup (3, \infty)$                       b)  $(-\infty, -11) \cup (-11, 2) \cup (2, \infty)$   
c)  $(-\infty, -2) \cup (-2, 11) \cup (11, \infty)$                       d)  $(-\infty, -22) \cup (-22, 3) \cup (3, \infty)$   
e)  $(-\infty, \frac{3}{22}) \cup (\frac{3}{22}, \infty)$                       f)  $(-\infty, \infty)$

12. Find the domain of the function  $g(x) = 3 - \sqrt{6-2x}$ .

- a)  $(-\infty, 3)$                       b)  $(3, \infty)$                       c)  $(-\infty, 3]$   
d)  $[3, \infty)$                       e)  $(-\infty, 6)$                       f)  $[6, \infty)$

13. Find  $f(0)$  if

$$f(x) = \begin{cases} 5x & \text{if } x < 0 \\ 3 & \text{if } 0 \leq x \leq 3 \\ x^2 & \text{if } x > 3 \end{cases}$$

- a) 0                      b) 2                      c) 3  
d) 0, 3                      e) 0, 2                      f) 2, 3

14. Find the average rate of change of the function  $f(x) = 6x^2 + \frac{4}{x^3}$  on the interval  $[-1, 3]$ .

- a)  $\frac{352}{27}$                       b)  $\frac{433}{27}$                       c)  $\frac{704}{27}$   
d)  $\frac{1192}{27}$                       e)  $\frac{1408}{27}$                       f)  $\frac{1732}{27}$

15. A driver of a car stopped at a gas station to fill up his gas tank. He looked at his watch and the time read exactly 3:40 p.m. At this time, he started pumping gas into the tank. At exactly 3:44 p.m., the tank was full and he noticed that he had pumped 10.7 gallons. What is the average rate of flow of the gasoline into the gas tank?

- a) 10.7 gallons/minute                      b) 5.35 gallons/minute                      c) 3.567 gallons/minute  
d) 2.675 gallons/minute                      e) 21.4 gallons/minute                      f) 42.8 gallons/minute

16. True or False. Each value in the range of a function is called an independent variable.

- a) True                      b) False

17. Fill in the blank: The zero product property says that if  $a \cdot b = 0$ , then \_\_\_\_\_

18. Fill in the blank: The square root property says that if  $k$  is a nonzero real number and  $x^2 = k$ , then  $x =$  \_\_\_\_\_
19. Fill in the blank: if we can draw a vertical line which intersects a graph \_\_\_\_\_, then the graph does not represent a function.
20. Find the average rate of change from  $x = 2$  to  $x = 5$  of the function whose graph is shown in Figure 3.

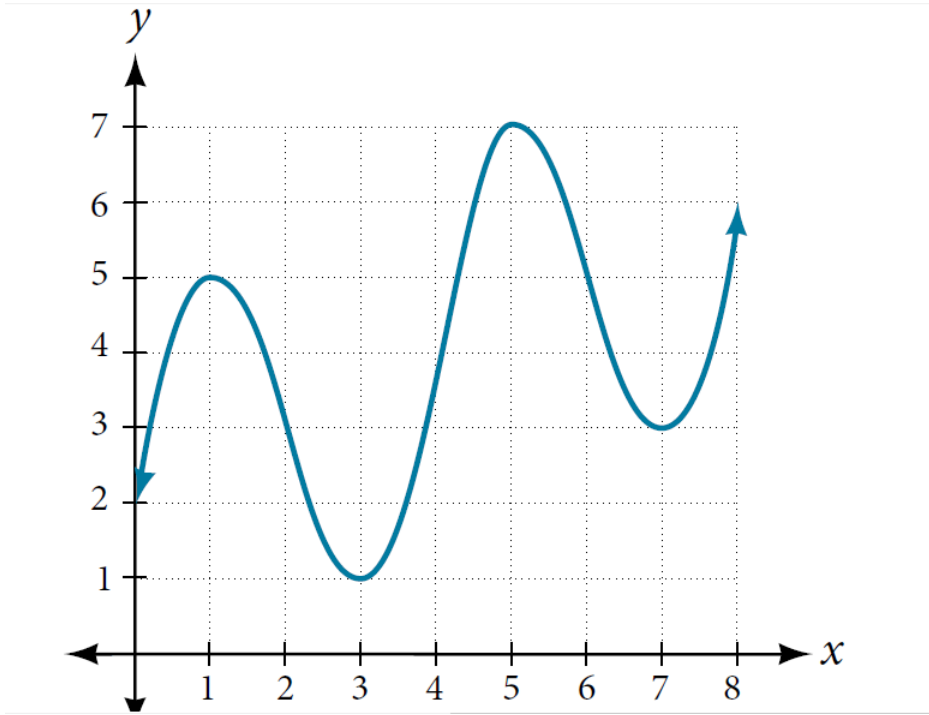


Figure 3: Figure for Question 20

- |                   |                  |                   |
|-------------------|------------------|-------------------|
| a) 2              | b) $\frac{4}{5}$ | c) $\frac{4}{3}$  |
| d) $-\frac{4}{3}$ | e) $\frac{3}{4}$ | f) $-\frac{3}{4}$ |

**Free response: Show all work in the space provided. Full credit will be given only if the necessary work is shown justifying your answer. Please write neatly. Scratch work will not be graded.**

21. (10 points) Complete the following sentences.

(a) The quadratic formula says that the solutions to the equation  $ax^2 + bx + c = 0$ ,  $a \neq 0$  is given by the formula:

(b) The Pythagorean Theorem says that for a right triangle, if  $a$  and  $b$  are the legs of the triangle adjacent to the  $90^\circ$  angle and  $c$  is the hypotenuse, then the relationship among  $a$ ,  $b$  and  $c$  is:

(c) A relation is

(d) A function is

(e) The horizontal line test says that if we can draw a horizontal line that intersects the graph of a function more than once, then

22. (10 points) Solve the given equation.

(a)  $x^3 + 3x^2 - 25x - 75$ .

(b)  $\sqrt{x-1} = x - 7$ . Be sure to check all solutions to eliminate extraneous solutions.

23. (10 points)

(a) Find the rate of change of the function  $f(x) = \frac{1}{x+4}$  on the interval  $[9, 9+h]$ . Simplify your answer.

(b) Find the number  $c$  such that the average rate of change of  $f(x) = \frac{1}{x}$  on the interval  $(1, c)$  is  $-\frac{1}{4}$ .

24. (10 points)

(a) A falling object travels a distance given by the formula  $d = 5t + 16t^2$  where  $t$  is measured on seconds. How long will it take for the object to travel 74 ft?

(b) The cost function for a certain company is  $C = 60x + 300$  and the revenue is given by  $R = 100x - 0.5x^2$ . Recall that profit is revenue minus cost. Set up a quadratic equation and find two values of  $x$  (production level) that will create a profit of \$300.