

**Math 1005: College Algebra**  
**Spring 2019 – May 9**  
**Final Exam**

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

Instructor's Name: \_\_\_\_\_

- This exam has 31 questions on 10 pages (not including this cover page). It is your responsibility to make sure you have all the pages.
- Show **all** of your work in the space provided. Clearly indicate your final answer.
- Points will be take off if it is not clear how you arrived at your final answer, even if your final answer is correct.
- Note:  $\log(x)$  (with no base) means  $\log_{10}(x)$ .
- Good luck!

Total: \_\_\_\_\_ / 120

1. Solve the equation  $\frac{1}{x-2} - 5 = \frac{1}{x+2}$ . /4

2. The width of the rectangle is 2 centimeters less than the length, and the area is 48 square centimeters. Find the dimensions (length and width) of the rectangle. /4

3. Solve the equation  $-6x - 15 = (2x + 5)^2$ . /4

4. Solve the inequality  $\frac{x}{2} - 5 \geq \frac{4x}{9}$ . Express your solution in interval notation. /4

5. Solve the inequality  $|2x - 1| - 2 > 1$ . Express your solution in interval notation. /4

6. Find the  $x$  and  $y$ -intercepts of the graph of  $y = x^2(x - 3)(x + 1)$ . /3

7. Write the slope-intercept form of the equation of the line with slope  $-1$  passing through the point  $(2, 7)$ . /3

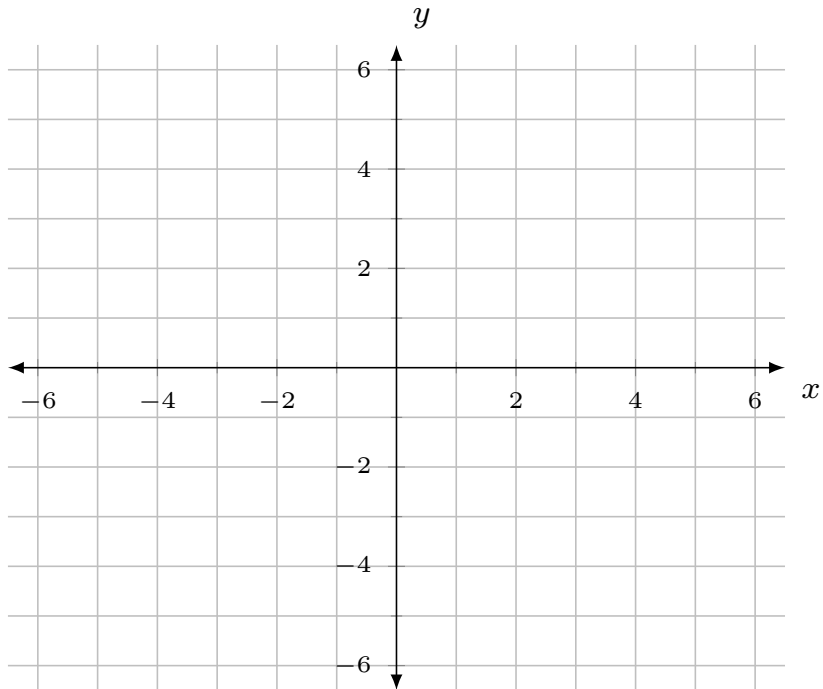
8. Solve the absolute value equation  $\left| \frac{1}{3}x + 5 \right| = \left| \frac{2}{3}x + 7 \right|$  /4

9. Write an equation of the line parallel to the line  $8x - 2y = 7$  passing through  $(2, -1)$ . /4

10. If  $f(x) = \begin{cases} x^3 - 2 & \text{if } x \leq 0 \\ 1 - 2x^2 & \text{if } x > 0 \end{cases}$ , find  $f(-1)$ ,  $f(0)$ , and  $f(1)$ . /3

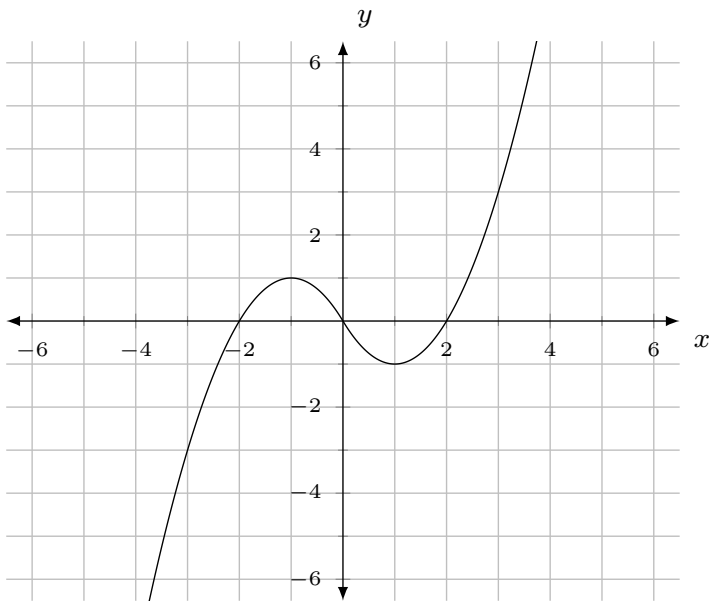
11. Find the inverse function  $f^{-1}(x)$  of the one-to-one function  $f(x) = \frac{2x}{x-1}$ . /3

12. Graph the equation  $x^2 + y^2 - 2x - 2y = 2$ . /4



13. Find the intervals where the function whose graph is shown below is increasing or decreasing:

/4



14. Find the domain of the function  $f(x) = \frac{x}{\sqrt{1-x}}$ . /4

15. Starting with the graph of  $y = \sqrt{x}$ , describe the sequence of transformations (in order) required to obtain the graph of  $f(x) = 2\sqrt{x-3} + 4$ . /5

16. The cost  $C$  in dollars for renting a car for one day is a function of the number of miles traveled,  $m$ . For a car renting for \$30.00 per day and \$0.25 per mile, this function is given by /5

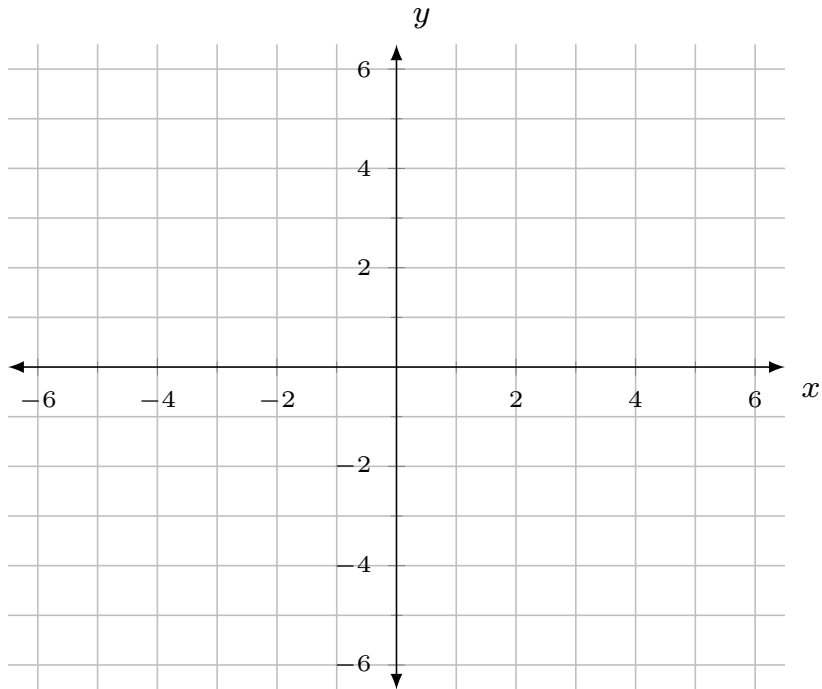
$$C(m) = 0.25m + 30.$$

(a) Find the cost of renting the car for one day and driving 230 miles.

(b) If the charge for renting the car for one day is \$57.50, how many miles were driven?

17. Graph  $y = -(x + 2)^2 + 3$ .

/3



18. Find the quotient and remainder  $\frac{x^3 - 2x^2 - 5x + 6}{x + 2}$ .

/4

19. Find all the zeros of  $f(x) = 2x^3 - 2x^2 - 8x + 8$ , given that 2 is one of the zeros.

/4

20. Use  $f(x) = 2x - 3$  and  $g(x) = 1 - 2x^2$  to evaluate  $g(f(2))$ . /3

21. Describe the end behavior of  $f(x) = (x + 3)^3(x - 5)^2$ . /3

22. Find the vertical and horizontal asymptotes of the graph of  $f(x) = \frac{2x^2 + 3}{x^2 - x - 20}$ . /4

23. The cost  $C$  of producing  $x$  thousand units of a product is given by /4

$$C = x^2 - 30x + 355 \text{ (dollars).}$$

Find the value of  $x$  for which the cost is minimum.



24. Solve the following equations:

/5

(a)  $5^{-x} = 125$ .

(b)  $\log_2 x = 5$

(c)  $2^{x+1} = 5$ .

25. Evaluate the following:

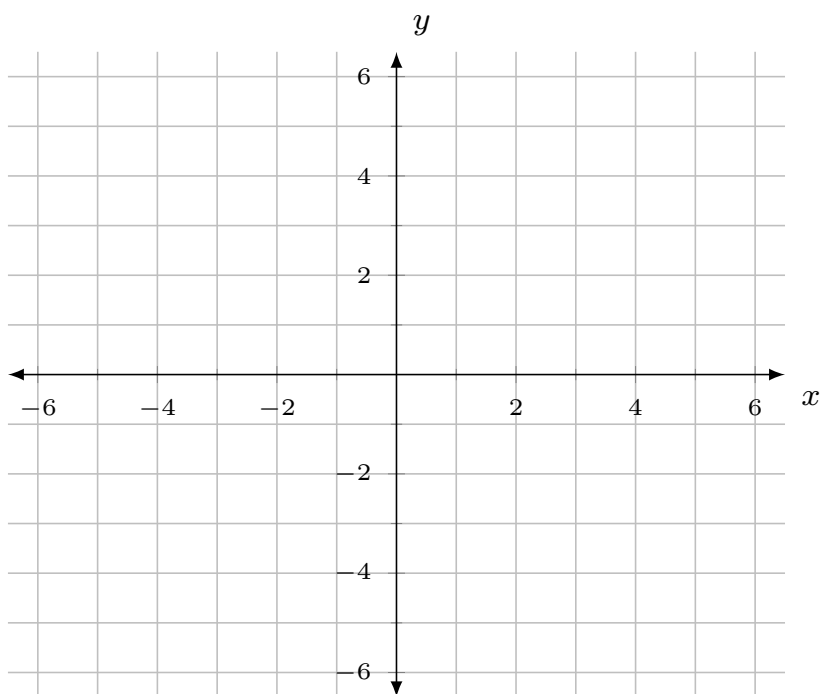
/5

(a)  $\log 0.001$ .

(b)  $\ln e^{-5}$ .

(c)  $\log_2 \frac{1}{8}$ .

26. Give the equation for the graph obtained by shifting the graph of  $y = \ln x$  up 3 units and 1 unit right. Then graph the equation you obtained. /4



27. Write  $3 \ln x + \ln(x^3 + 2) - \frac{1}{2} \ln(3x^2 + 2)$  in condensed form. /4

28. Solve the equation  $\log x = \log 6 - \log(x - 1)$ . /4

29. Suppose 15,000 is invested in a savings account paying 7% interest per year. /3  
Write the formula for the amount in the account after year  $t$  years if the interest is compounded continuously.

30. Solve the system of equations  $\begin{cases} x + 2y = 8 \\ 3x + 6y = 24 \end{cases}$  . /4

31. Solve the system of equations  $\begin{cases} -2x + y = 4 \\ 4x - 2y = 4 \end{cases}$  . /4