

Name: _____

Exam 1

Show all your work to receive full credit.

1. (2 points each) Consider the numbers $-9.8, 3\frac{1}{5}, \sqrt[3]{4}, 0.38, 0, \sqrt{13}, \frac{8}{5}, -4$.

(a) Which are whole numbers?

(b) Which are rational numbers?

2. (2 points) Write interval notation for $\{x \mid -10 < x \leq 4\}$.

3. (2 points) Compute and write scientific notation for $\frac{3.9 \times 10^{-2}}{5.2 \times 10^7}$.

4. (3 points each) Simplify.

(a) $(-6a^2b^{-5})(3a^4b^7)$

(b) $\frac{2 + \frac{2}{y}}{y - \frac{2}{y}}$

5. (3 points each) Factor.

(a) $4x^2 + 3x - 10$

(b) $n^3 - 27$

6. (4 points) Subtract and simplify $\frac{x}{x^2-49} - \frac{5}{x^2-6x-7}$
7. (3 points) Solve $x^2 - 2x - 15 = 0$ algebraically for x .
8. (3 points) Solve $A = \frac{1}{2}h(b_1 + b_2)$ for b_1 .
9. (3 points) A guy wire is extended from the top of a 9-ft pole to a place on the ground 4 ft from the base of the pole. How long is the guy wire? Round your answer to the nearest tenth of a foot.
10. (2 points each) Consider the relation $\{(-1, 0), (3, -1), (4, 6), (-4, 2)\}$
- (a) Is this a function?
- (b) What is the range of the relation?
11. (2 points each) Consider the function $f(x) = \sqrt{x^2 - 16}$
- (a) Use your grapher to graph the function. Raise your hand to have the instructor check your answer.
- (b) Visually estimate the domain of $f(x)$.

12. (3 points) Write the equation for the line that passes through $(5, 0)$ and $(-3, -6)$.

13. (3 points) Determine whether the lines

$$\begin{cases} y + 2x = 6 \\ 2x - y = 4 \end{cases}$$

are parallel, perpendicular, or neither.

14. The table below shows the amount of waste generated in pounds per person, per day, in the United States over several years.

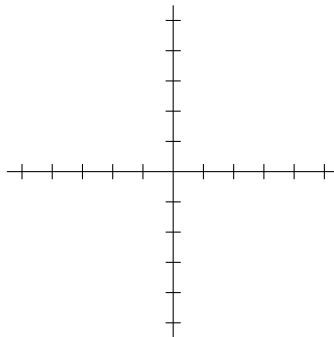
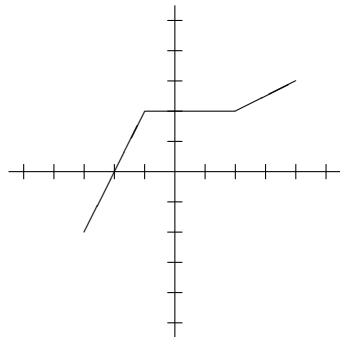
Year, x	Average local monthly bill
1980, 0	3.7
1985, 5	3.8
1990, 10	4.3
1995, 15	4.3

(a) (4 points) Use a grapher to fit a regression line to the data. Write the equation of the line.

(b) (2 points) Use the regression line to predict the amount of waste generated per person, per day, in 2003.

15. (3 points) Write an equation for a function that has the shape of $y = x^3$ but shifted left 3 units and up 2 units.

16. (4 points) The graph of the function $y = f(x)$ is shown on the left. On the right, make a graph of $y = f(-x)$.



17. For $f(x) = -2x - 5$ and $g(x) = x^2 - 4$, find

(a) (1 point) the domain of f

(b) (1 point) the domain of g

(c) (3 points) $(f - g)(x)$

(d) (3 points) $(fg)(x)$

(e) (2 points) the domain of $(f/g)(x)$

18. Solve. Find exact solutions.

(a) (4 points) $x + 3\sqrt{x} - 40 = 0$

(b) (3 points) $\frac{40}{2x - 3} + \frac{30}{4x + 5} = -11$

(c) (4 points) $|x - 3| \leq 7$

19. Simplify.

(a) (3 points) $(6 + 4i)(7 - 3i)$

(b) (2 points) i^{16}

20. Consider the function $f(x) = -x^2 - 4x + 2$.

(a) (3 points) Find the vertex.

(b) (3 points) Find the line of symmetry

(c) (2 points) Is there a maximum? If so, what is it?

(d) (2 points) Is there a minimum? If so, what is it?

21. (4 points) The sum of the base and the height of a triangle is 60 in. Find the dimensions for which the area is maximum.