

**1 Do five of the following six problems: 1–6**

1. Use properties of exponents to simplify  $(\frac{a^3b^{-2}}{a^{-3}bx})^{-2}$ . Write your answer with only positive exponents.
2. Expand and simplify  $(5x - 4)^2$ .
3. Perform the indicated operations and simplify as much as possible  $\frac{\frac{2}{7} + \frac{1}{3}}{\frac{1}{21} + \frac{2}{14}}$ .
4. Simplify  $(27x^{15})^{-\frac{2}{3}}$  and eliminate any negative exponents.
5. Solve  $P = 2L + 2W$  for L.
6. Let  $A(-6, -1)$  and  $B(2, 7)$  be points in the plane.
  - (a) Find the slope of the line that contains A and B.
  - (b) Find the length of the segment  $AB$ .

**2 Do five of the following six problems: 7–12**

7. Solve for x in the equation  $3(1 - x) = 5(1 + 2x) + 2$ .
8. Solve the equation  $x^2 - x = 56$ .
9. Find the standard form of the equation of the circle having diameter with endpoints  $(-11, 9)$  and  $(7, -1)$ .
10. Solve  $\frac{1}{x} - \frac{1}{x-4} = 1$  for x.
11. Given  $f(x) = \sqrt{\frac{x^2+1}{2}}$  and  $g(x) = 3 + \sqrt{x}$ . Compute and simplify  $f \circ g(16)$ .
12. Evaluate the function and simplify  $h(3 - 2a)$  when  $h(x) = \frac{x^2+9}{2}$ .

**3 Do five of the following six problems: 13–18**

13. Sketch a graph of the piecewise defined function

$$f(x) = \begin{cases} 4 & \text{if } x \leq -1 \\ -x^2 & \text{if } x > -1 \end{cases}$$

14. Graph the function  $r(x) = (x-1)^3 + 4$  by indicating how a more basic function has been shifted, reflected, stretched, or compressed. Label all x-intercepts and y-intercepts clearly on your graph.
15. Determine whether  $f(x) = -5x^2 - 40x - 81$  has either a maximum or a minimum or neither. If either a maximum or a minimum, find what that value is and where it occurs.
16. Use transformations of the graph  $y = \frac{1}{x}$  to graph the rational function  $g(x) = \frac{2x-3}{x-2}$ . Label all asymptotes and intercepts clearly on your graph.
17. Given  $f(x) = |x + 2| - 1$ . Determine
  - (a) All local maximum and minimum of f and the value of x at which each occurs.
  - (b) The intervals on which f is increasing and on which f is decreasing.
18. The sum of two numbers is twice their difference. The larger number is 6 more than twice the smaller. Find the two numbers.

**4 Do five of the following six problems: 19–24**

19. Find the exact value of  $\cos(-570^\circ)$ .
20. Find the exact value of  $\sin \frac{7\pi}{6}$ .
21. Find the terminal point  $P(x, y)$  on the unit circle determined by  $t = -\frac{\pi}{6}$ .
22. The point P is on the unit circle. Find the y-coordinate of the point  $P(x, y)$  if the x-coordinate of P is  $x = -\frac{12}{13}$  and the y-coordinate is negative.
23. Solve the system

$$\begin{cases} x + 4y = 8 \\ 3x + 12y = 24. \end{cases}$$

or show that it has no solution. (If there is no solution, enter NO SOLUTION. If there are an infinite number of solutions, enter the general solution in terms of t, where t is any real number.)

24. The system of equations has a unique solution. Find the solution using Gaussian elimination or Gauss Jordan elimination.

$$\begin{cases} x + y + z = 10 \\ 2x - 3y + 2z = 20 \\ 4x + y - 3z = 5. \end{cases}$$