

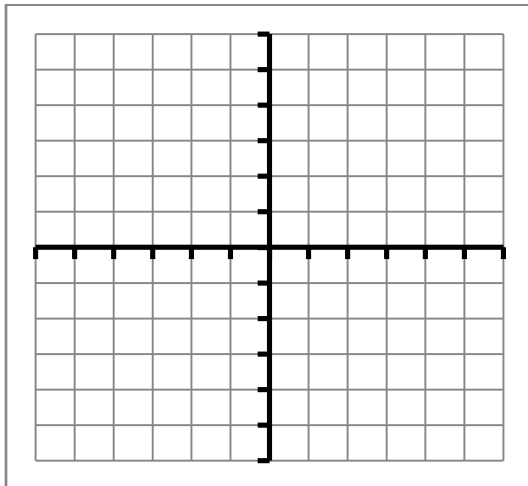
1. Find the real solutions, if any, of
 - a. $x^2 + 3x + 9 = 0$
 - b. $x^2 - 4x - 2 = 0$

2. Calculate:
 - a. $3i(-3 + 4i)$
 - b. $\frac{2+3i}{1-i}$

3. Solve $4 - 2x > 1 + x$ for x , express the result as an interval, and draw it on a number line.

4. Equations of circles:
 - a. What are the center and radius of a circle with equation $x^2 + (y + 2)^2 = 9$?
 - b. Write an equation of the circle with center at $(4,2)$ and radius 2.

5. Put $f(x) = x^2 - 2x + 2$ into the standard form $a(x - h)^2 + k$. Then sketch the graph of $f(x)$ and label
 - a. The vertex
 - b. The axis of symmetry
 - c. The y-intercept
 - d. The x-intercepts, if any.



6. Which of the following define y as a function of x ? (OK just to say "Yes" or "No")

a. $\{(-4,4), (-2,4), (-3,1), (-0,0)\}$

b. $y = |x|$

c.

X (state)	Y (Senator)
Arizona	McCain
NY	Clinton
Washington	Murray
Arizona	Kyl

7. Find the domain for each of these functions

a. $f(x) = \sqrt[2]{x+2}$

b. $g(x) = \frac{x}{x^2-x}$

c. $h(x) = \ln(x+4)$

8. If $f(x) = x^2 + 1$ and $g(x) = \sqrt{x}$ then evaluate

a. $f(-1)$

b. $g(f(x))$

c. $f(g(x))$

9. The graph of $y = f(x)$ is shown below:

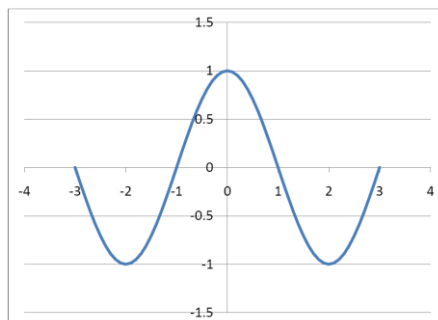
a. Is $f(x)$ even, odd, or neither?

b. Is $f\left(\frac{1}{2}\right)$ positive, negative, or zero?

c. List any intervals on which $f(x)$ is increasing

d. Identify any local minima of $f(x)$

e. How often does the line $y = 2$ intersect the graph?



10. Transformations of graphs

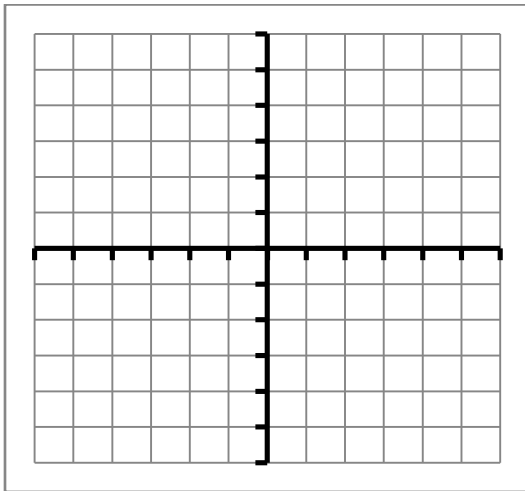
- What equation is obtained by shifting the graph of $f(x) = \ln(x)$ to the right by 2 units?
- What function has the same graph as $f(x) = x^2$, shifted down by 1 unit?

11. For each of the following, say if it is a polynomial, and if it is, state the degree

- $g(x) = \frac{x^4-1}{x^2}$
- $f(x) = x^2 + e^x$
- $h(x) = x(x^2 + 1)$

12. Analyze $f(x) = \frac{x+1}{x-2}$ and provide the following information:

- Domain
- Vertical asymptotes if any
- Horizontal asymptote if any
- All intercepts
- Sketch the graph



13. Say whether each of the following is an *exponential* function of x

- $f(x) = \ln(x^2)$
- $f(x) = e^2$
- $f(x) = x^5$
- $f(x) = 3^x$

14. Solve $3^{x-2} = 9^x$ for x

15. Logarithms

- a. Write this equation as an equivalent equation involving an exponent: $\log_{10}(y) = 3$
- b. Find $\log_2(16)$

16. Logarithms, continued

- a. Write this a single logarithm and simplify if possible: $3 \log_2(u) - \log_2(u^2)$
- b. Find $\log_5(712)$ with a calculator by using the LN (natural logarithm) key.

17. You have 100 yards of fencing and will use it to enclose 3 sides of a rectangular lot. The 4th side is the wall of a large building, so it doesn't need fencing.

- a. Express the area A of the rectangle as a function of w , the dimension of the rectangle perpendicular to the existing wall.
- b. What is the domain of the function?
- c. What is the area if the width is 20 feet?

18. A colony of bacteria grows exponentially. The population is measured to be 2000. Then 2 hours later it is 3,000.

- a. Write an equation for the population as a function of time.
- b. What will the population be at 4 hours?
- c. When will the population be 10,000?