

Factor each expression.

1) $x^3 - 4x$

2) $x^2 - 2x - 15$

3) $2x^2 + 7x - 15$

4) $x^4 - 6x^2 - 27$

5) $x^2 - xy - 6y^2$

6) $4x^4 - 10x^3 + 4x^2$

Solve each equation.

7) $x(2x+5) = 2(2x+3)$

8) $x^2 + 8x = 2$

9) $3x^2 - 2x = 2x + 7$

10) $(2x-1)^2 - 1 = 19$

11) $\sqrt{x+14} - 2 = x$

12) $-3\sqrt{2x+5} + 8 = -7$

State the Domain of each function.

13) $g(x) = x^2 + 4x + 6$

14) $h(x) = \sqrt{2x-5}$

15) $f(x) = \sqrt{3-x}$

16) $f(x) = \sqrt{9-x^2}$

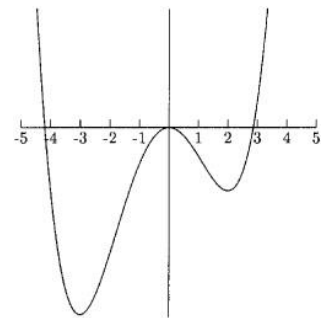
17) $t(v) = \sqrt{v^2 - 16}$

18) $g(x) = \frac{x}{2x-4}$

19) $q(w) = \frac{\sqrt{w+2}}{w^2-1}$

20) $f(x) = \frac{x}{\sqrt{2-x}}$

21) On what intervals is the graph to the right increasing? Decreasing?

**Use the definition of even and odd functions to show if the functions below are even, odd, or neither.**

22) $f(x) = x^2 - 1$

23) $f(x) = x^3 + 2x$

24) $f(x) = x^3 - 2x + 1$

25) $f(x) = \frac{\sqrt{x^2 - 4}}{x}$

Graph the following piecewise functions.

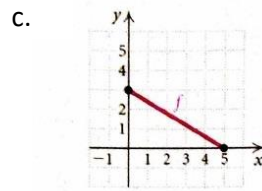
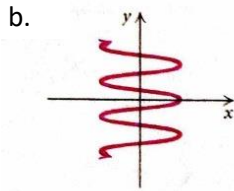
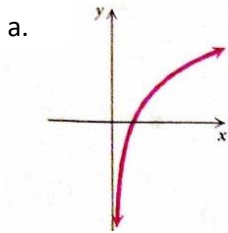
$$26) f(x) = \begin{cases} 2x + 1 & x \geq 1 \\ x^2 + 3 & x < 1 \end{cases}$$

$$27) f(x) = \begin{cases} x^2 - 1 & x \leq 0 \\ 2x - 1 & 0 < x \leq 5 \\ 3 & x > 5 \end{cases}$$

$$28) f(x) = \begin{cases} 5 & x \leq -3 \\ -2x - 3 & x > -3 \end{cases}$$

$$29) f(x) = \begin{cases} 2x + 1 & x \geq 1 \\ |x| & x < 1 \end{cases}$$

30) For each graph below, is f a function?



31) Sketch a possible solution curve for the given information.

- f is continuous
- $f(-x) = f(x)$
- f is increasing on $[0, 2]$ and decreasing on $[2, \infty)$
- $f(2) = 3$

Review the 10 basic functions and their properties – Domain, Range, Continuity, Increasing/Decreasing, Symmetry, Boundedness, Extrema, Asymptotes, and End Behavior. Sketch each of the 10 basic functions on the attached paper, then, using your graphs, answer the questions below.

Sketch each of the 10 basic functions on graph paper, then, using your graphs, answer the questions below.

32) Which of the functions are even? Odd?

33) Which of the functions have the property $f(0) = 0$?

34) Which functions increase on their entire domain?

35) Which functions are bounded? Are they bounded above, below, or both? List them and their boundedness.

36) Which functions have the end behavior of $\lim_{x \rightarrow \infty} f(x) = \infty$ and $\lim_{x \rightarrow -\infty} f(x) = -\infty$? Which functions have the end behavior of $\lim_{x \rightarrow \pm\infty} f(x) = \infty$?

37) Which functions have asymptotes? List them and their asymptotes.