





Determine the end behavior and maximum number of turns.

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


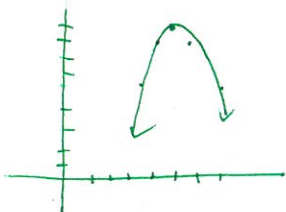
2. $f(x) = 5 - \frac{7}{2}x - 3x^2$ 1 turn


3. $f(x) = 2x^5 - 5x + 1$
 max of 4 turns


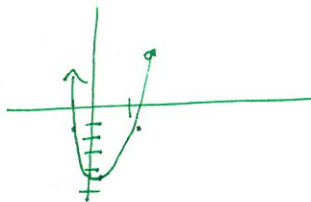
4. $f(x) = -\frac{2}{3}(x^2 - 5x + 3)$ 1 turn


Put into vertex form and sketch a graph of each function.

5. $f(x) = -x^2 + 10x - 16$
 $f(x) = -(x^2 - 10x + 25) - 16 + 25$
 $f(x) = -(x - 5)^2 + 9$



6. $f(x) = 3x^2 - 2x - 4$
 $f(x) = 3(x^2 - \frac{2}{3}x + \frac{1}{9}) - 4 - \frac{1}{3}$
 $f(x) = 3(x - \frac{1}{3})^2 - 4\frac{1}{3}$



Simplify.

7. $(5 - 2i)^2$
 $25 - 20i + 4i^2$
 $21 - 20i$

8. $\frac{(3 - 4i)(4 - 3i)}{(4 + 3i)(4 - 3i)}$
 $\frac{12 - 16i - 9i + 12i^2}{16 - 9i^2}$
 $\frac{-25i}{25} = -i$

Divide.

9. $(6x^3 - 16x^2 + 17x - 6) \div (3x - 2)$

$$\begin{array}{r} 2x^2 - 4x + 3 \\ 3x - 2 \overline{) 6x^3 - 16x^2 + 17x - 6} \\ \underline{-6x^3 + 12x^2} \\ -12x^2 + 17x \\ \underline{+12x^2 + 8x} \\ 9x - 6 \\ \underline{9x - 6} \\ 0 \end{array}$$

10. $(5x^3 + 18x^2 + 7x - 6) \div (x + 3)$

$$\begin{array}{r} 5x^2 + 3x - 2 \\ x + 3 \overline{) 5x^3 + 18x^2 + 7x - 6} \\ \underline{-5x^3 - 15x^2} \\ 3x^2 + 7x - 6 \\ \underline{-3x^2 - 9x} \\ 2x - 6 \\ \underline{-2x - 6} \\ 0 \end{array}$$

11. $(5x^3 + 6x + 8) \div (x + 2)$

$$\begin{array}{r} 5x^2 - 10x + 26 + \frac{-44}{x+2} \\ -2 \overline{) 5x^3 + 0x^2 + 6x + 8} \\ \underline{-5x^3 - 10x^2} \\ 10x^2 + 6x + 8 \\ \underline{-10x^2 - 20x} \\ 26x + 8 \\ \underline{-26x - 52} \\ -44 \end{array}$$

12. $\frac{4x^3 + 16x^2 - 23x - 15}{x + \frac{1}{2}}$

$$\begin{array}{r} 4x^2 + 14x - 30 \\ x + \frac{1}{2} \overline{) 4x^3 + 16x^2 - 23x - 15} \\ \underline{-4x^3 - 2x^2} \\ 18x^2 - 23x - 15 \\ \underline{-18x^2 - 7x} \\ -30x - 15 \\ \underline{30x + 15} \\ 0 \end{array}$$

Use synthetic division to find given points on the graph of $f(x)$.

13. $f(x) = 4x^3 - 13x + 10$ for $f(-2)$ and $f(4)$

$$\begin{array}{r|rrrr} -2 & 4 & 0 & -13 & 10 \\ & & -8 & 16 & -6 \\ \hline & 4 & -8 & 3 & 4 \end{array}$$

$$f(-2) = 4$$

$$\begin{array}{r|rrrr} 4 & 4 & 0 & -13 & 10 \\ & & 16 & 64 & 204 \\ \hline & 4 & 16 & 51 & 214 \end{array}$$

$$f(4) = 214$$

Use the given zero and synthetic division to factor the polynomial and list all the real zeros.

14. $x^3 - 7x + 6 = 0$, $x = 2$

$$\begin{array}{r|rrrr} 2 & 1 & 0 & -7 & 6 \\ & & 2 & 4 & -6 \\ \hline & 1 & 2 & -3 & 0 \end{array}$$

$$(x+3)(x-1)$$

$$x = 2, -3, 1$$

15. $2x^3 - 15x^2 + 27x - 10 = 0$, $x = \frac{1}{2}$

$$\begin{array}{r|rrrr} \frac{1}{2} & 2 & -15 & 27 & -10 \\ & & 1 & -7 & 10 \\ \hline & 2 & -14 & 20 & 0 \end{array}$$

$$(x-2)(x-5)$$

$$x = \frac{1}{2}, 2, 5$$

16. $x^3 + 2x^2 - 3x - 6 = 0$, $x = \sqrt{3}$

$$\begin{array}{r|rrrr} \sqrt{3} & 1 & 2 & -3 & -6 \\ & & 2\sqrt{3} & 2\sqrt{3}+3 & 6 \\ \hline & 1 & 2+\sqrt{3} & 2\sqrt{3} & 0 \end{array}$$

$$(x+2)(x+\sqrt{3})$$

$$x = -2, \sqrt{3}, -\sqrt{3}$$

Find all the real zeros by factoring.

17. $f(x) = x^2 - 25$

$$0 = (x+5)(x-5)$$

$$x = \pm 5$$

18. $f(x) = x^4 - x^3 - 20x^2$

$$0 = x^2(x^2 - x - 20)$$

$$0 = x^2(x-5)(x+4)$$

$$x = 0 \text{ (mult. 2), } 5, -4$$

19. $f(x) = 2x^4 + 2x^2 - 40$

$$0 = 2x^4 + 2x^2 - 40$$

$$0 = x^4 + x^2 - 20$$

$$0 = (x^2+5)(x^2-4)$$

$$0 = (x^2+5)(x+2)(x-2)$$

$$x = \pm 2 \text{ real zeros}$$

20. $f(x) = x^3 - 4x^2 - 25x + 100$

$$0 = x^2(x-4) - 25(x-4)$$

$$0 = (x-4)(x^2-25)$$

$$0 = (x-4)(x+5)(x-5)$$

$$x = 4, 5, -5$$