

1. $x^2 - x - 12$
 $a=1$ $b=-1$ $c=-12$

$\begin{array}{r} -12 \\ -4 \end{array} \begin{array}{r} 3 \\ -1 \end{array} \begin{array}{r} (x-4)(x+3) \end{array}$
 $\boxed{x=4}$
 $\boxed{x=-3}$

$x-4=0$
 $x=4$

2. $x^2 - 11x + 28$
 $a=1$ $b=-11$ $c=28$

$\begin{array}{r} 28 \\ -7 \end{array} \begin{array}{r} 4 \\ -11 \end{array} \begin{array}{r} (x-7)(x-4) \end{array}$
 $\boxed{x=7}$
 $\boxed{x=4}$

3. $3x^2 - 11x + 6$
 $a=3$ $b=-11$ $c=6$

$\begin{array}{r} 18 \\ -9 \end{array} \begin{array}{r} -2 \\ -11 \end{array} \begin{array}{r} (x-9)(x-2) \end{array}$
 $\boxed{x=3}$
 $\boxed{x=\frac{2}{3}}$

$3x-2=0$
 $\frac{3x}{3}=\frac{2}{3}$
 $x=\frac{2}{3}$

$(x-3)(3x-2)$

4. $6x^2 - 5x + 1$
 $\begin{array}{r} 6 \\ -3 \end{array} \begin{array}{r} 2 \\ -5 \end{array} \begin{array}{r} (x-\frac{3}{6})(x-\frac{2}{6}) \end{array}$
 $\boxed{\text{Zeros: } \frac{1}{2}, \frac{1}{3}}$

$(x-\frac{1}{2})(x-\frac{1}{3})$
 $(2x-1)(3x-1)$
 Factored form

5. $3x^3 - 5x^2 + 2x$
 $x(3x^2 - 5x + 2)$

$\begin{array}{r} 6 \\ -3 \end{array} \begin{array}{r} -2 \\ -5 \end{array} \begin{array}{r} (x-0)(x-\frac{3}{3})(x-\frac{2}{3}) \end{array}$
 $\boxed{x=0}$
 $\boxed{x=1}$
 $\boxed{x=\frac{2}{3}}$

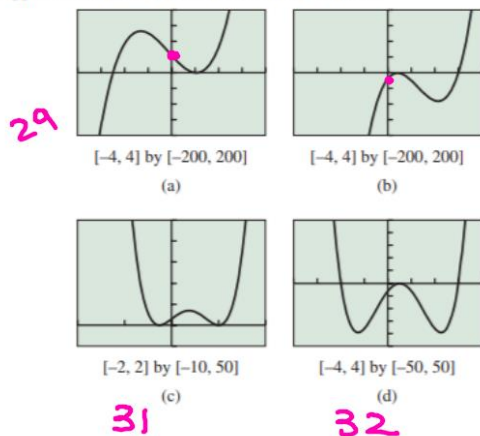
$x(x-1)(3x-2)$

6. $6x^3 - 22x^2 + 12x$
 $2x(3x^2 - 11x + 6)$

$\begin{array}{r} 18 \\ -9 \end{array} \begin{array}{r} -2 \\ -11 \end{array} \begin{array}{r} 2x(x-9)(x-2) \end{array}$

$2x(x-3)(x-\frac{2}{3})$
 $2x(x-3)(3x-2)$
 $x=0, 3, \frac{2}{3}$

In Exercises 29–32, match the polynomial function with its graph. Approximate all of the real zeros of the function.



P193.

29. $f(x) = 20x^3 + 8x^2 - 83x + 55$ y-int $\odot$ cubic

30. $f(x) = 35x^3 - 134x^2 + 93x - 18$

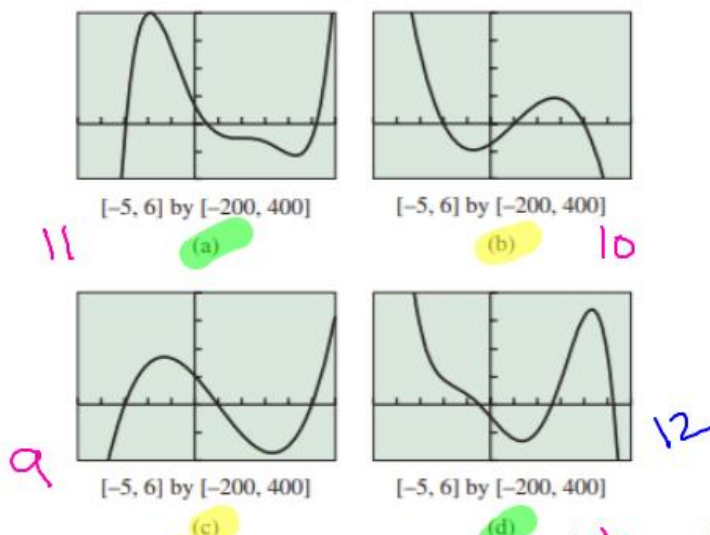
31. $f(x) = 44x^4 - 65x^3 + x^2 + 17x + 3$ y-int $\odot$

32. $f(x) = 4x^4 - 8x^3 - 19x^2 + 23x - 6$ y-int $\odot$

Quartic $\cup$

29-a 31-c
30-b 32-d.

In Exercises 9–12, match the polynomial function with its graph. Explain your choice. Do not use a graphing calculator.



9. $f(x) = 7x^3 - 21x^2 - 91x + 104$ y-int $\odot$ down up.

10. $f(x) = -9x^3 + 27x^2 + 54x - 73$ leading coeff. $\ominus$ up, down

11. $f(x) = x^5 - 8x^4 + 9x^3 + 58x^2 - 164x + 69$ down, up.

12. $f(x) = -x^5 + 3x^4 + 16x^3 - 2x^2 - 95x - 44$ up, down

Notes

End Behavior of polynomials.

Degree		up or down
even	odd	
$\lim_{x \rightarrow \infty} f(x) = \infty$ $\lim_{x \rightarrow -\infty} f(x) = \infty$	$\lim_{x \rightarrow \infty} f(x) = \infty$ $\lim_{x \rightarrow -\infty} f(x) = -\infty$	up or down
$\lim_{x \rightarrow \infty} f(x) = -\infty$ $\lim_{x \rightarrow -\infty} f(x) = -\infty$	$\lim_{x \rightarrow \infty} f(x) = -\infty$ $\lim_{x \rightarrow -\infty} f(x) = \infty$	up or down

