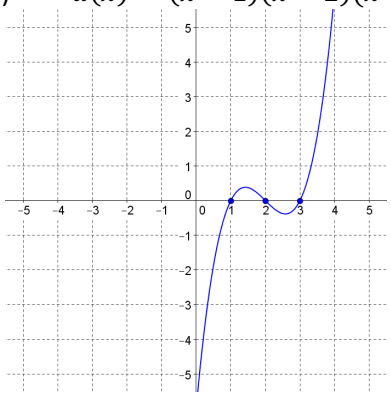
SM3 3.4: Graphing Polynomials

Sketch the polynomial with accurate roots and end behavior. Discuss the end behavior of the polynomial using limit notation.

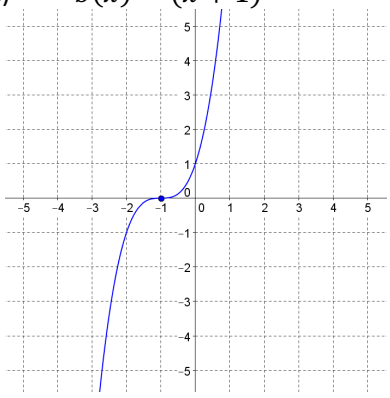
1) $a(x) = (x-1)(x-2)(x-3)$



$\lim_{x \to -\infty} a(x) = -\infty$

$\lim_{x \to \infty} a(x) = \infty$

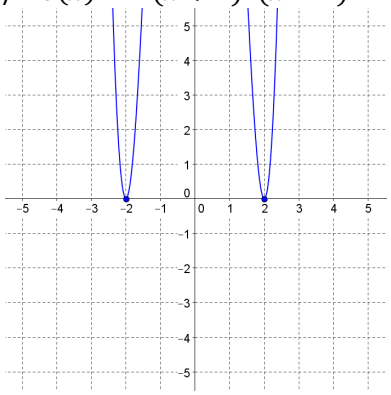
2) $b(x) = (x+1)^3$



$\lim_{x \to -\infty} b(x) = -\infty$

$\lim_{x \to \infty} b(x) = \infty$

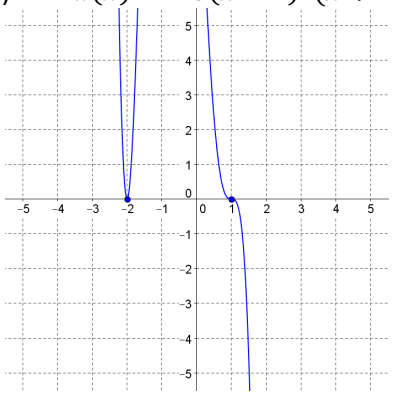
3) $c(x) = 2(x+2)^2(x-2)^2$



$\lim_{x \to -\infty} c(x) = \infty$

$\lim_{x \to \infty} c(x) = \infty$

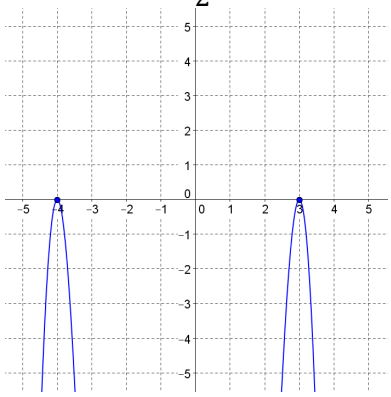
4) $d(x) = -3(x-1)^3(x+2)^2$



$\lim_{x \to -\infty} d(x) = \infty$

$\lim_{x \to \infty} d(x) = -\infty$

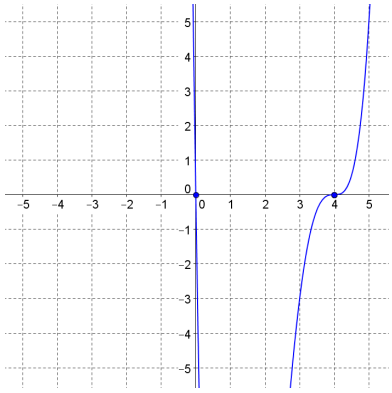
5) $f(x) = -\frac{1}{2}(x+4)^2(x-3)^2$



$\lim_{x \to -\infty} f(x) = -\infty$

$\lim_{x \to \infty} f(x) = -\infty$

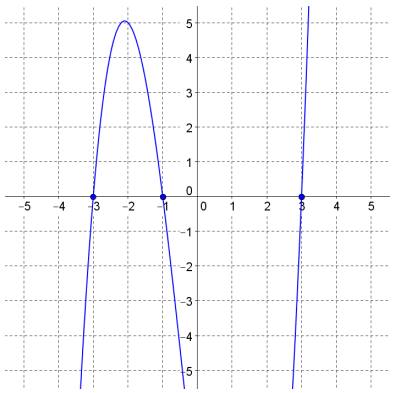
6) $g(x) = x(x-4)^3$



$\lim_{x \to -\infty} g(x) = \infty$

$\lim_{x \to \infty} g(x) = \infty$

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

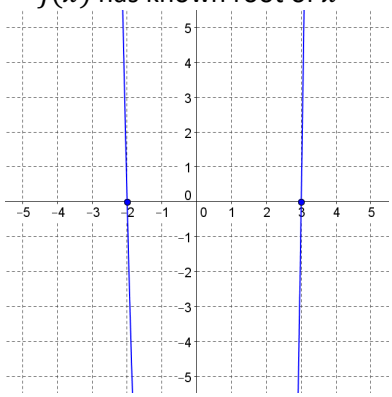


$\lim_{x \to -\infty} h(x) = -\infty$

$\lim_{x \to \infty} h(x) = \infty$

8) $j(x) = x^4 - x^3 - 2x^2 - 4x - 24$

$j(x)$ has known root of $x = -2i$



$\lim_{x \to -\infty} j(x) = \infty$

$\lim_{x \to \infty} j(x) = \infty$

State the least degree polynomial with rational coefficients, in descending order, that has the given roots.

9) $x = \{-2, 5\}$

$f(x) = (x + 2)(x - 5)$

$f(x) = x^2 - 3x - 10$

10) $x = \left\{-3, \frac{1}{2}\right\}$

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

$f(x) = 2x^2 + 5x - 3$

11) $x = \{5i\}$

$f(x) = (x + 5i)(x - 5i)$

$f(x) = x^2 + 25$

12) $x = \left\{-1, -\frac{3}{4}\right\}$

$f(x) = (x + 1)(4x + 3)$

$f(x) = 4x^2 + 7x + 3$

13) $x = \left\{\frac{2}{3}, \frac{3}{2}\right\}$

$f(x) = (3x - 2)(2x - 3)$

$f(x) = 6x^2 - 13x + 6$

14) $x = \{4 - i\}$

$f(x) = (x - 4 + i)(x - 4 - i)$

$f(x) = x^2 - 8x + 17$

15) $x = \{-3, 0, 3\}$

$f(x) = (x + 3)(x + 0)(x - 3)$

$f(x) = x(x^2 - 9)$

$f(x) = x^3 - 9x$

16) $x = \{-2$ w/ m. of 2, $2\}$

$f(x) = (x + 2)(x + 2)(x - 2)$

$f(x) = (x + 2)(x^2 - 4)$

$f(x) = x^3 + 2x^2 - 4x - 8$

17) $x = \{-6, -4, 1 + 3i\}$

$f(x) = (x + 6)(x + 4)(x - 1 - 3i)(x - 1 + 3i)$

$f(x) = (x^2 + 10x + 24)(x^2 - 2x + 10)$

$f(x) = x^4 + 8x^3 + 14x^2 + 52x + 240$