Write a polynomial functions of least degree that has rational coefficients, a leading coefficient of 1 and the given zeros.

1. $x = -7$, $x = 4$

$y = a(x+7)(x-4)$

$y = a(x^2 - 4x + 7x - 28)$

$y = a(x^2 + 3x - 28)$

$y = x^2 + 3x - 28$

2. $x = \sqrt{6}$, $x = -\sqrt{6}$

$y = (x - \sqrt{6})(x + \sqrt{6})$

$y = x^2 + \sqrt{6}x - \sqrt{6}x - 6$

$y = x^2 - 6$

3. $x = 4 + i$, $x = 4 - i$

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

$x^2 - 4x + xi$

$-4x \quad +16 - 4i$

$-xi \quad +i \quad +4i$

$y = x^2 - 8x + 17$

$x = \frac{1}{4}$, $x = 1$

$y = a(x - \frac{1}{4})(x - 1)$

$= a(4x - 1)(x - 1)$

$= a(4x^2 - 4x - 1x + 1)$

$= a(4x^2 - 5x + 1)$

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

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

$f(x) = \frac{1}{4}(4x - 1)(x - 1)$ intercept

$= (x - \frac{1}{4})(x - 1)$ intercept

Write the equation for the polynomial with the given roots and y-intercept.

4. (-7, 0) (3, 0), (2, 0), (0, 14)

x y

$y = a(x+7)(x-3)(x-2)$

$14 = a(7)(-3)(-2)$

$14 = 42a$

$\frac{1}{3} = a$

$y = \frac{1}{3}(x+7)(x-3)(x-2)$

5. (-4, 0), (4, 0), (-2, 0), (0, -64)

x y

$y = a(x+4)(x-4)(x+2)$

$-64 = a(4)(-4)(2)$

$-64 = -32a$

$a = 2$

$y = 2(x+4)(x-4)(x+2)$

$= 2(x^2 - 4x + 4x - 16)(x+2)$

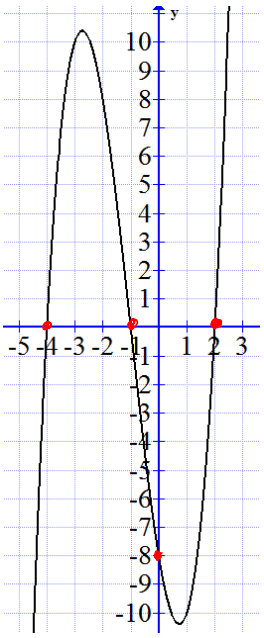
$= 2(x^2 - 16)(x+2)$

$= 2(x^3 + 2x^2 - 16x - 32)$

$= 2x^3 + 4x^2 - 32x - 64$

Write the equation for the given polynomial.

6.



$y = a(x+4)(x+1)(x-2)$

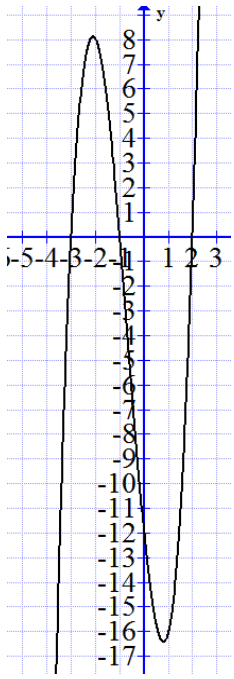
$-8 = a(4)(1)(-2)$

$-8 = -8a$

$a = 1$

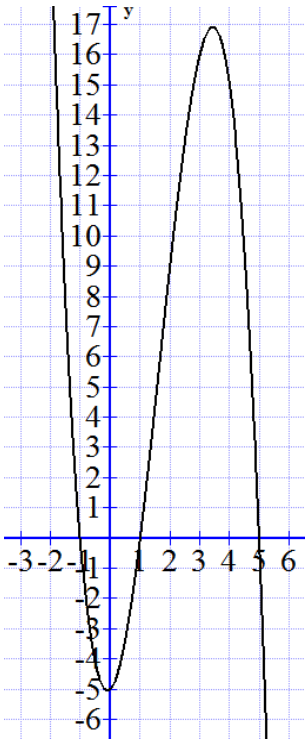
$y = (x+4)(x+1)(x-2)$

7.

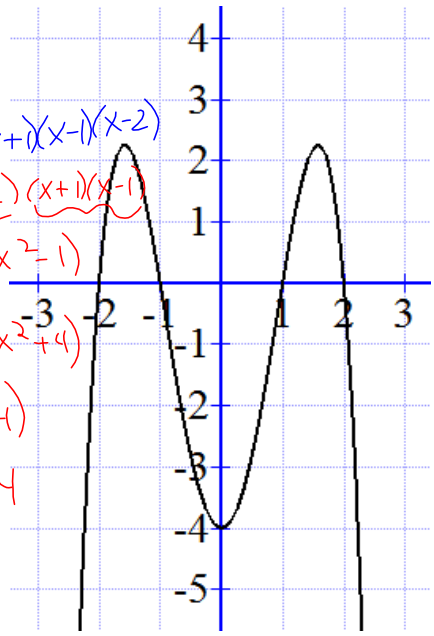


$y = 2x^3 + 4x^2 - 10x - 12$

8.



9.



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

$(x+2)(x-2)\ (x+1)(x-1)$

$y = a(x^2-4)(x^2-1)$

$y = -1(x^4 - x^2 - 4x^2 + 4)$

$y = -1(x^4 - 5x^2 + 4)$

$y = -x^4 + 5x^2 - 4$

State the degree and describe the end behavior without graphing.

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

$x \to -\infty \quad y \to -\infty$

$x \to \infty \quad y \to \infty$

11. $f(x) = -7x^5 + 2$

Degree: 5

$x \to \infty \quad x \to -\infty$

$x \to -\infty \quad x \to \infty$

12. $f(x) = -2x^6 + 3x^2 - 12$

$x \to -\infty \quad y \to -\infty$

$x \to \infty \quad y \to -\infty$

13. $f(x) = x^4 - 8$

$x \to -\infty \quad f(x) \to \infty$

$x \to \infty \quad f(x) \to \infty$

odd #'s
standard

even #'s
intercept