Write an equation for the linear function f in point-slope form, standard form, and slope-intercept form.

Standard

pt-slope $y-y_1=m(x-x_1)$ Slope-intercept $y=mx+b$

$Ax+By=C$

No fractions

$$f(-1) = -6 \; and \; f(2) = 9$$

x_1 y_1 x_2 y_2

$m=\frac{y_2-y_1}{x_2-x_1}$

$\frac{9+6}{2+1}=\frac{15}{3}=5$

$y+6=5(x+1)$

$y+6=5x+5$
$-6 \quad -6$

$y=5x-1$

$-5x+y=-1$

$5x-y=1$

Put the function into vertex form by completing the square then use the quadratic formula to find the x-intercepts

$$\frac{f(x)}{2} = \frac{2x^2}{2} + \frac{8x}{2} - \frac{6}{2}$$

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

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

$+4$

$$\frac{f(x)}{2} + 7 = (x+2)^2$$

$$\frac{f(x)}{2} = (x+2)^2 - 7$$

$$= 2(x+2)^2 - 14$$

$a=2 \quad b=8 \quad c=-6$

$$-\frac{b}{2a} \pm \sqrt{\frac{b^2-4ac}{2a}}$$

$$-\frac{8}{2(2)} \pm \frac{\sqrt{8^2-4(2)(-6)}}{2(2)}$$

$$-2 \pm \frac{\sqrt{64-(-48)}}{4}$$

$$-2 \pm \frac{\sqrt{112}}{4}$$

Put the function in vertex form without completing the square. Find the x-intercepts without using the quadratic formula.

$$f(x) = \underset{a}{\underline{3}}x^2 - 12x + 4$$

$X = \frac{-b}{2a}$

$= \frac{12}{2(3)} = 2$

$3(2)^2 - 12(2) + 4$

$12 - 24 + 4$

-8

h K
$(2, -8)$

$y = a(x-h)^2 + K$

$y = 3(x-2)^2 - 8$

$0 = 3\underline{(x-2)}^2 - 8$
$+8 \qquad +8$

$8 = 3(x-2)^2$

$\frac{8}{3} = (x-2)^2$

$\pm\sqrt{\frac{8}{3}} = x - 2$

$2 \pm \sqrt{\frac{8}{3}}$

Write an equation for the quadratic function that contains the given vertex and point.

Vertex (4, -1) Point (3, 2)

h k x y

$y = a(x-h)^2 + k$

$2 = a(3-4)^2 - 1$

$2 = a(-1)^2 - 1$

$2 = a - 1$

$+1 \quad +1$

$a = 3$

$y = 3(x-4)^2 - 1$

Describe how to transform the graph of an appropriate monomial function $f(x) = x^3$ onto the given polynomial function. Then find the y-intercept of the function.

Reflection over x-axis

Vert Compress by Factor $\frac{5}{9}$

Right 3

Up 4

$$g(x) = -\frac{5}{\cancel{8}\,9}(x-3)^3 + 4$$

$$-\frac{5}{9}(0-3)^3 + 4$$

$$-\frac{5}{9}(-3)^3 + 4$$

$$-\frac{5}{\cancel{9}_1}(-\cancel{27}^{3}) + 4$$

$$-5(-3) + 4$$

$$19$$

$$\left(-\frac{5}{\cancel{9}_1}\right)\left(\frac{-\cancel{27}^{3}}{1}\right)$$

Describe the end behaviors of the polynomial function.

$$g(x) = -x^5 - 3x^3 + x^2 - 10$$

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

Find the zeros of the function algebraically.

$$f(x) = 3x^3 + 4x^2 - 15x$$

$0 = x(3x^2 + 4x - 15)$

$0 = x(3x - 5)(x + 3)$

$\underline{x = 0}$ | $3x - 5 = 0$ $x + 3 = 0$

$+5 \quad +5$ $-3 \quad -3$

$3x = 5$ $\underline{x = -3}$

$\underline{x = \frac{5}{3}}$

Give the degree of the polynomial. Find the zeros of the polynomial function and state the multiplicity of each. Then determine if the graph crosses the x-axis or touches at any of the zeros.

Degree = 10

$$g(x) = 8x(x-3)^4(x+7)^5$$

Zeros	mult	
$x=3$	4	touch
$x=-7$	5	Cross
$x=0$	1	Cross

Find the cubic function with the given zeros.

X= -3, -1, 8

$$(x+3)(x+1)(x-8)$$

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

$$\begin{array}{r} x^3+4x^2+3x \\ -8x^2-32x-24 \\ \hline x^3-4x^2-29x-24 \end{array}$$

Find the average rate of change for the function $f(x) = 4x^2 - 5$ on the interval $[-3, b]$.

$f(-3) = 4(-3)^2 - 5$

$4(9) - 5$

$36 - 5$

31

$(-3, 31)$ $(b, 4b^2 - 5)$

x_1 y_1 x_2 y_2

$$\frac{4b^2 - 5 - 31}{b - (-3)} = \frac{4b^2 - 36}{b + 3} = \frac{4(b^2 - 9)}{b + 3}$$

$$= \frac{4\cancel{(b+3)}(b-3)}{\cancel{b+3}}$$

$$4(b-3)$$