Using the same function, use the factored form and information about the x-intercepts to find the line of symmetry, the maximum or minimum point, and the y-intercept of the graph.

$h(x)$ $j(n)$

$k(x)$

Use the standard form of the polynomial to locate the line of symmetry, maximum or minimum point, and y-intercept of the graph.

$h(x)$ $j(n)$

$k(x)$

$a \cdot b = 0$

$a \cdot b \cdot c = 0$

Consider the function $q(x) = \overset{a}{x}(x \overset{b}{-} 3)(x \overset{c}{+} 5)$.

a. What are the zeros of $q(x)$?

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

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

$x=3$ $x=-5$

b. Write the rule for $q(x)$ in standard form.

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

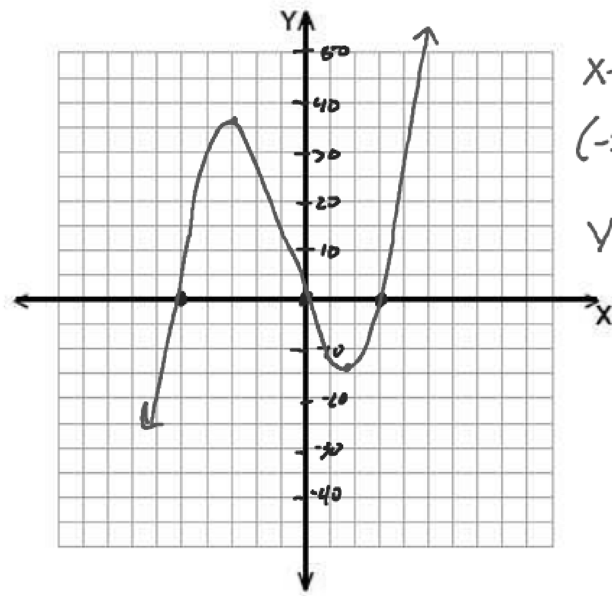
$x(x^2+2x-15)$

$q(x) = x^3+2x^2-15x$

c. Identify the degree of $q(x)$. How could you have predicted that property of the polynomial before any algebraic manipulation?

D = 3 Number of linear Factors

d. Graph $q(x)$ and label the x-intercepts, y – intercepts, and local extrema.




X-intercepts

(-5,0) (0,0) (3,0)

Y-intercept

(0,0)

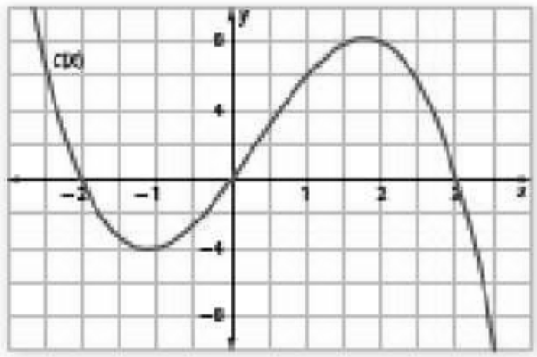
Local max

(-3,36)

Local min

(1.67, -14.81)

The graph below is a polynomial function *c(x)*.




a. What is the degree of *c(x)*? Explain how you know.

3- x-intercepts    2- turning pts.

$x=0 \quad x=-2 \quad x=3$ ← zeros

$x \quad x+2 \quad x-3$ ← factors

b. Use the information from the graph to write a possible rule for *c(x)*. Express the rule in equivalent factored form and standard polynomial form.

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

$x(x^2-x-6)$

$c(x) = x^3 - x^2 - 6x$

c. Use you calculator to graph the rule from Part b. If needed adjust the rule to give a better fit.

$c(x) = -(x^3 - x^2 - 6x)$

$-x^3 + x^2 + 6x$

Looking back at problems 1-3, how can you tell the zeros of a polynomial function when its rule is written as a product of linear factors?

Set each Factor equal to zero and solve.

Looking back at problems 1-3, how can you tell the degree of a polynomial function when its rule is written as a product of linear factors?

Degree = # of Linear Factors.

Which properties of a polynomial and its graph are shown best when the rule is written as a product of linear factors? When the rule is written in standard form?

Factored Form — Zeros.

Standard Form — Y-intercept

Multiply each set of polynomials. Write them in standard form. Give the degree of the product.

1) $(2x-3)(4x-1)$

$8x^2-2x-12x+3$

$8x^2-14x+3$

D= 2

2) $2(3x-7)(x+5)$

Degree 2

$2(3x^2+15x-7x-35$

$2(3x^2+8x-35)$

$6x^2+16x-70$

3) $x(x+6)(x-2)$

Degree 3

$x(x^2-2x+6x-12)$

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

$x^3+4x^2-12x$

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

$(x-3)(x^2-x-20)$

$x^3-x^2-20x$

$-3x^2+3x+60$

$x^3-4x^2-17x+60$

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

$3x^3+6x^2-6x$

$-x^2-2x+2$

$3x^3+5x^2-8x+2$

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

$x^5-3x^3+2x$

$-4x^4+12x^2-8$

$x^5-4x^4-3x^3+12x^2+2x-8$

$(x^6 - 5x^5 + 3x^4 + 7x^3 - 6x^2 + 2x - 8)(x^2 + 7x + 12)$

Divide f(x) by d(x) using long division. Write a summary statement in polynomial form and factored form.

$f(x) = x^2 + 5x + 6$ $d(x) = x + 2$