

Sec 4.3 Attributes of Cubic Functions

Factored Form: $f(x) = (2x - 5)(2x + 1)(2x + 7)$

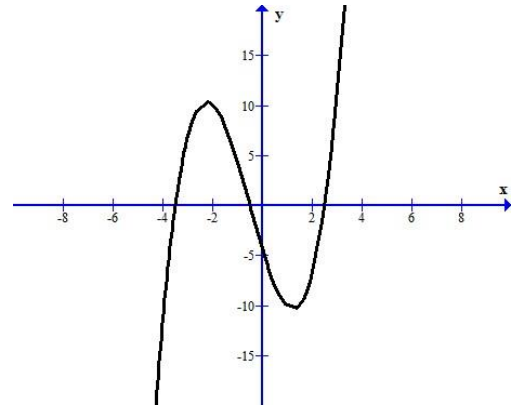
Standard Form: $f(x) = 8x^3 + 12x^2 - 66x - 35$

Relative maximum –

Relative minimum –

Roots –

End Behavior –



Standard Form

$$f(x) = ax^3 + bx^2 + cx + d$$

Factored Form

$$f(x) = a(x - r_1)(x - r_2)(x - r_3)$$

A cubic function is a polynomial function of degree 3 and must have 3 roots. Roots may be real or imaginary and can appear multiple times. **Multiplicity** is how many times a particular number is a root for a given polynomial function. Multiplicity is the **DEGREE** of the factor.

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

↙
↘

m2
m1

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

↘

m3

Multiplicity tells you about the behavior of your graph at the x-intercepts.

Multiplicity of 1:

Multiplicity of even #s:

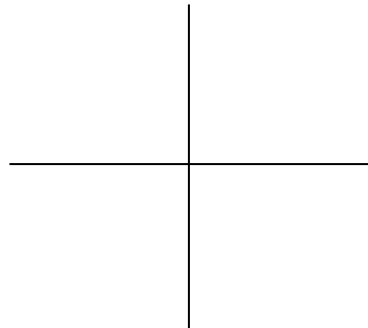
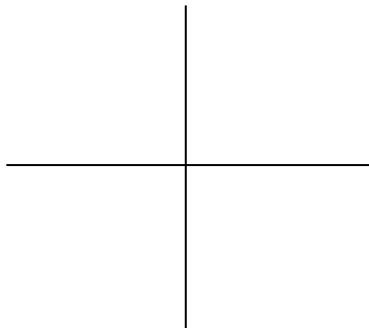
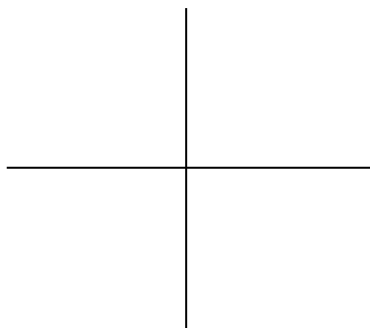
Multiplicity of odd #s > 1:

Graph the following equations in the calculator, and then sketch the graph. Label the roots of each graph and what behavior is happening at each root.

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

b. $y = (x - 3)^3$

c. $y = -(x + 3)^1(x - 3)^2$

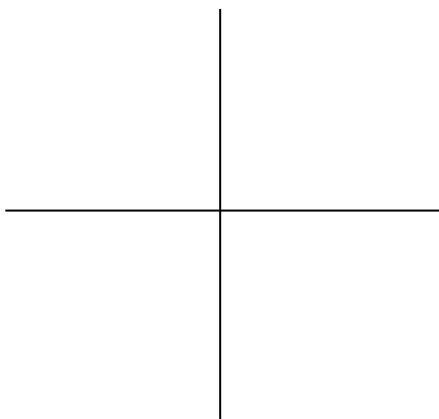


What is the relative maximum of the graph $y = x^3 + 8x^2 + 15x$?

What is the relative minimum of the graph $y = x^3 - 3x^2 - 4x$?

Ex. 1: Graph $f(x) = (x + 2)(3x - 2)(4 + x)$.

Sketch:



Roots: _____

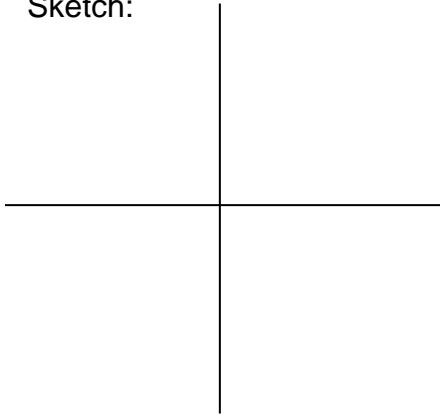
Multiplicity of each: _____

Standard Form: _____

End Behavior: _____

Ex. 2: Graph $f(x) = -2x(x - 3)^2$.

Sketch:



Roots: _____

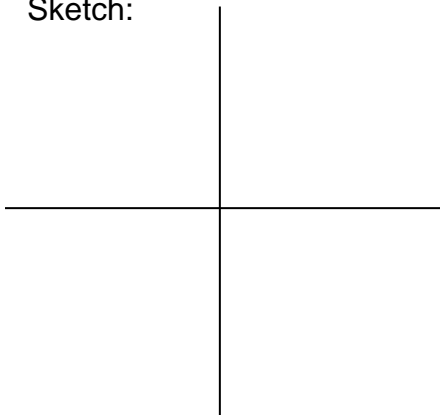
Multiplicity of each: _____

Standard Form: _____

End Behavior: _____

EX 3: Graph $f(x) = x(x + 2)^2$.

Sketch:



Roots: _____

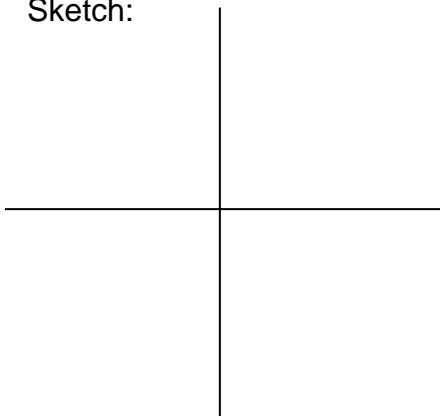
Multiplicity of each: _____

Standard Form: _____

End Behavior: _____

EX 4: Graph $f(x) = (6 - x)(2x^2 - 3x + 1)$.

Sketch:



Roots: _____

Multiplicity of each: _____

Standard Form: _____

End Behavior: _____