

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

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

$$\textcircled{1} \text{ b) } g(f(x))$$

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

$$= 2x^2 + 6x - 4 - 3$$

$$= 2x^2 + 6x - 7$$

$$\textcircled{2} \text{ a) } y = x^2 + 8x + 3$$

$$y - 3 = x^2 + 8x + 16$$

$$y + 13 = (x + 4)^2$$

$$y = (x + 4)^2 - 13$$

Vertex: $(-4, -13)$

$$\textcircled{3} \text{ a) } y = (x+2)(x+3)(x-2)$$

(i) Roots \rightarrow x int ($y=0$)

$$0 = (x+2)(x+3)(x-2)$$

$$x = -3, -2, 2$$

$$a = 1$$

Starts in Q3

Ends in Q1

(ii) y int ($x=0$)

$$y = (0+2)(0+3)(0-2)$$

$$y = (2)(3)(-2)$$

$$y = -12$$

(iii) Approx Local Max
($x = -2.5$)

$$y = (-2.5+2)(-2.5+3)(-2.5-2)$$

$$y = (-0.5)(0.5)(-4.5)$$

$$y = 1.125$$

$$(-2.5, 1.125)$$

Approx Local Min
($x = 0$)

$$y = (0+2)(0+3)(0-2)$$

$$y = (2)(3)(-2)$$

$$y = -12$$

$$(0, -12) \text{ * Approxim}$$

$$\textcircled{7} \text{ a) } x^3 + 5x^2 - 9x > 45$$

$$x^3 + 5x^2 - 9x - 45 > 0 \quad \leftarrow \begin{array}{l} \text{positive} \\ \text{"y" values} \end{array}$$

$$y = x^3 + 5x^2 - 9x - 45$$

① Roots (y=0)

$$0 = (x^3 + 5x^2)(9x - 45)$$

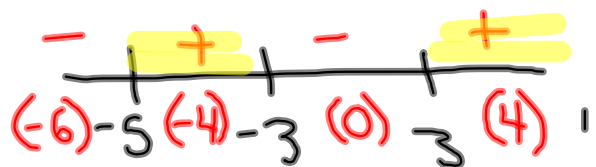
$$0 = x^2(x+5) - 9(x+5)$$

$$0 = (x^2 - 9)(x+5)$$

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

$$x = -5, -3, 3$$

②/③ Number Line / Test Value



$$x \in (-5, -3) \cup (3, \infty)$$

Test Values

$y = (-6+3)(-6-3)(-6+5)$	$y = (-1)(-7)(1)$	$y = (3)(-3)(5)$	$y = (7)(1)(9)$
$y = (-3)(-9)(-1)$	$y = 7$	$y = -45$	$y = 63$
$y = 0 \neq 0$			

$$\textcircled{1} a) x^3 + 5x^2 - 9x \leq 45$$

$$x^3 + 5x^2 - 9x - 45 \leq 0$$

$$y = x^3 + 5x^2 - 9x - 45$$

changed from original

y values that less than or equal to 0

① Roots (y=0)

$$0 = x^3 + 5x^2 - 9x - 45$$

$$x = -5, -3, 3$$

(factored on previous page)

② y int (x=0)

$$y = (0)^3 + 5(0)^2 - 9(0) - 45$$

$$y = -45$$

③ Degree

3rd Degree
Cubic

④ Stretch Factor

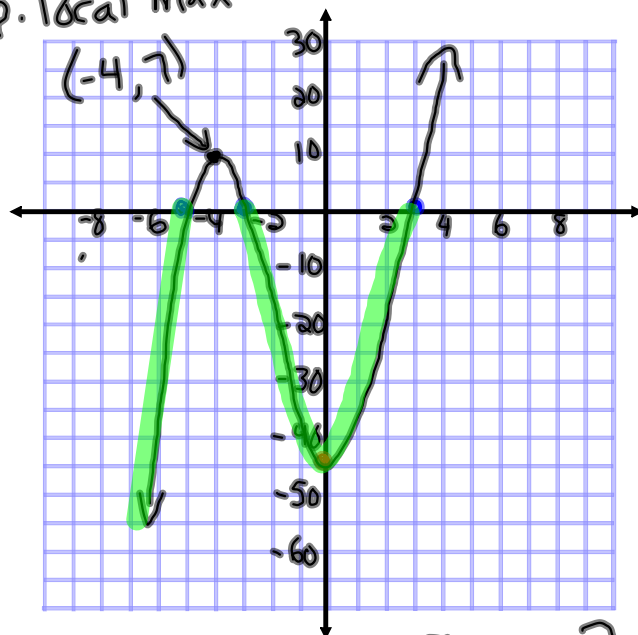
$$a = 1$$

Starts in Q3

Ends in Q1

app. local max

(-4, 7)



$$x \in (-\infty, -5] \cup [-3, 3]$$

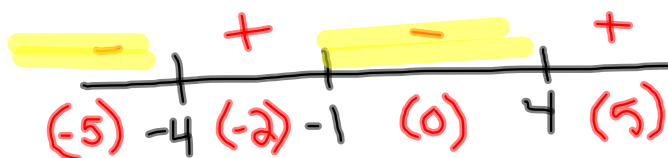
$$\begin{aligned} \textcircled{1} \text{ i) } & 4x^2 - c^2 - 12x + 9 \\ & (4x^2 - 12x + 9) - c^2 \\ & (2x - 3)(2x - 3) - c^2 \\ & \boxed{(2x - 3)^2} - \boxed{c^2} \\ & (2x - 3 - c)(2x - 3 + c) \end{aligned}$$

⑥ $x^3 + x^2 < 16x + 16$ "y" values that are less than 0
 $x^3 + x^2 - 16x - 16 < 0$
 $y = x^3 + x^2 - 16x - 16$

① Roots ($y=0$)

$y = x^3 + x^2 - 16x - 16$
 $0 = (x^3 + x^2)(-16x - 16)$
 $0 = x^2(x+1) - 16(x+1)$
 $0 = (x^2 - 16)(x+1)$
 $0 = (x-4)(x+4)(x+1)$
 $x = -4, -1, 4$

②/③ Number Line / Test Value



④ State Intervals

$x \in (-\infty, -4) \cup (-1, 4)$

Answer

* $y = (x-4)(x+4)(x+1)$ Not necessary to show
 $y = (-5-4)(-5+4)(-5+1)$ ← this
 $y = (-9)(-1)(-4)$
 $y = -36$

$$\textcircled{1} \text{ f) } 4x^4 - 33x^2 + 36 \quad \sqrt{4 \cdot 36} = 12 \cdot 2 = \underline{\underline{24}}$$

$$(4x^4 - \underline{24}x^2 + 36) - 9x^2$$

$$\boxed{(2x^2 - 6)^2} - \boxed{9x^2}$$

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

$$\textcircled{1} \text{ e) } x^4 + x^2 - 20$$

$$\underline{5} x \underline{-4} = -20$$

$$\underline{5} + \underline{-4} = 1$$

$$(x^2 + 5)(x^2 - 4)$$

$$(x^2 + 5)(x + 2)(x - 2)$$