

# Skills 3 - Answer Key

#1.

a)  $y = 2x^2 - x - 5$   

$$\frac{1 \pm \sqrt{(-1)^2 - 4(2)(-5)}}{2(2)} = \frac{1 \pm \sqrt{1+40}}{4} = \frac{1 \pm \sqrt{41}}{4}$$

b)  $y = x^2 - 6x + 4$   

$$\frac{6 \pm \sqrt{(-6)^2 - 4(1)(4)}}{2(1)} = \frac{6 \pm \sqrt{36-16}}{2} = \frac{6 \pm \sqrt{20}}{2} = \frac{6 \pm 2\sqrt{5}}{2} = 3 \pm \sqrt{5}$$

c)  $y = 6x - 1 - 2x^2$   

$$\frac{-6 \pm \sqrt{6^2 - 4(-2)(-1)}}{2(-2)} = \frac{-6 \pm \sqrt{36-8}}{-4} = \frac{6 \pm \sqrt{28}}{4} = \frac{6 \pm 2\sqrt{7}}{4} = \frac{3 \pm \sqrt{7}}{2}$$

#2.

a)  $x^3 - 8$  ;  $x=2$  is a zero

$$\begin{array}{r} x^2 + 2x + 4 \\ x-2 \overline{) x^3 - 8} \\ \underline{-x^3 + 2x^2} \phantom{+ 4} \\ 2x^2 - 8 \\ \underline{-2x^2 + 4x} \phantom{+ 4} \\ 4x - 8 \\ \underline{-4x + 8} \\ 0 \end{array}$$

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

b) This one has a typo, so it doesn't make sense

c)  $x^4 - 4x^2 + 7x + 14$  ;  $x=2, -2, \text{ or } 7$  as a zero

$x = -2$ :  $(-2)^4 - 4(-2)^2 + 7(-2) + 14 = 0$

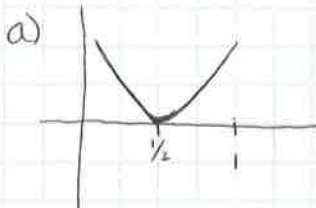
$x = 2$ :  $(2)^4 - 4(2)^2 + 7(2) + 14 = 28$

$x = 7$ :  $(7)^4 - 4(7)^2 + 7(7) + 14 = 2268$

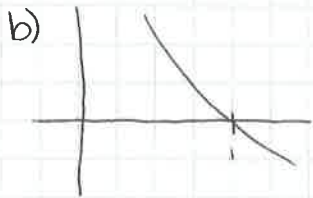
$$\begin{array}{r} x^3 - 2x^2 + 7 \\ x+2 \overline{) x^4 - 4x^2 + 7x + 14} \\ \underline{-x^4 - 2x^3} \phantom{+ 14} \\ -2x^3 - 4x^2 + 7x + 14 \\ \underline{+2x^3 + 4x^2} \phantom{+ 14} \\ 7x + 14 \\ \underline{-7x - 14} \\ 0 \end{array}$$

$$x^4 - 4x^2 + 7x + 14 = (x+2)(x^3 - 2x^2 + 7)$$

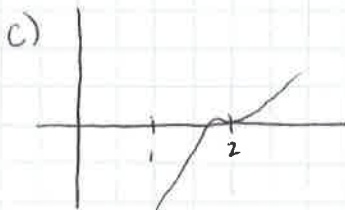
#3.



Positive on both sides.



Changes from positive to negative.



Positive on both sides.

*this one has two zeros very close together, so you need to zoom in pretty tight to see the "local" behavior at  $x = 2$ .*

#4

a)  $(x-5)^3$  at  $x=5$ : Changes from negative to positive.

b)  $-(x+1)^3$  near  $x=-1$ : Negative on both sides.

c)  $(x-1)(x-2)^4$  near  $x=2$ : Positive on both sides.

d)  $(x-1)(x-2)(x-3)$  near  $x=3$ : Changes from negative to positive.

e)  $(x-2)^2(x-3)$  near  $x=2$ : Negative on both sides.