QUIZ # 5

SOLUTIONS.

1) GRAPH $y = -3x^2 + 12x - 5$

SOLUTIONS:

y-int: $x = 0$

$y = -3(0)^2 + 12(0) - 5 = -5$

$(0, -5)$

x-int: $y = 0$

$0 = -3x^2 + 12x - 5$

$$x = \frac{-12 \pm \sqrt{(12)^2 - 4(-3)(-5)}}{2(-3)}$$

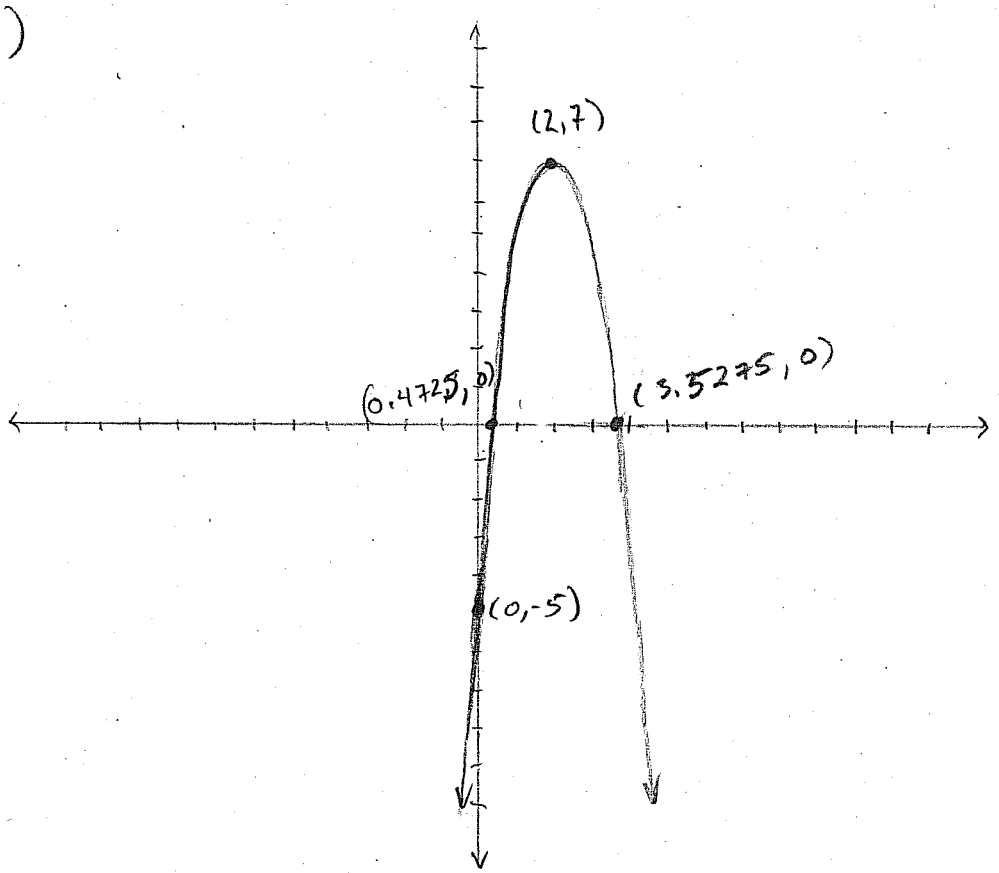
$$= \frac{-12 \pm \sqrt{84}}{-6}$$

≈ 0.4725 AND 3.5275

VERTEX:

$$x_v = \frac{-b}{2a} = -\frac{12}{2(-3)} = 2, \quad y_v = -3(2)^2 + 12(2) - 5 = 7$$

$\therefore (2, 7)$



2) SOLVE THE SYSTEM:

① $x^2 - y = -1$

② $x^2 + y^2 = 5$

SOLUTION:

① - ② $-y - y^2 = -6$

$y^2 + y - 6 = 0$

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

$y = -3, 2$

FROM ①:

$\underline{y = -3}$ $x^2 - (-3) = -1$

$x^2 = -4$ NO SOLUTION.

$\underline{y = 2}$ $x^2 - (2) = -1$

$x^2 = 1$

$x = \pm 1$.

∴ THE SOLUTIONS ARE $x = -1$, $y = 2$

$x = 1$, $y = 2$

3) FIND THE EQUATION OF THE QUADRATIC THAT PASSES THROUGH THE POINTS $(8,30)$, $(-16,81)$, $(32,267)$

$$y = ax^2 + bx + c$$

① $30 = a(8)^2 + b(8) + c \Rightarrow 64a + 8b + c = 30$

② $81 = a(-16)^2 + b(-16) + c \Rightarrow 256a - 16b + c = 81$

③ $267 = a(32)^2 + b(32) + c \Rightarrow 1024a + 32b + c = 267$

$$a = \frac{\begin{vmatrix} 30 & 8 & 1 \\ 81 & -16 & 1 \\ 267 & 32 & 1 \end{vmatrix}}{\begin{vmatrix} 64 & 8 & 1 \\ 256 & -16 & 1 \\ 1024 & 32 & 1 \end{vmatrix}} = \frac{-480 + 2136 + 2592 - (-4272) - 960 - 648}{-1024 + 8192 + 8192 - (-16384) - 2048 - 2048}$$

$$= \frac{6912}{27648} = \frac{1}{4}$$

$$b = \frac{\begin{vmatrix} 64 & 30 & 1 \\ 256 & 81 & 1 \\ 1024 & 267 & 1 \end{vmatrix}}{\begin{vmatrix} 64 & 8 & 1 \\ 256 & -16 & 1 \\ 1024 & 32 & 1 \end{vmatrix}} = \frac{5184 + 30720 + 68352 - 82944 - 17088 + 6912}{27648}$$

$$= \frac{-3456}{27648} = -\frac{1}{8}$$

$$c = \frac{\begin{vmatrix} 64 & 8 & 30 \\ 256 & -16 & 81 \\ 1024 & 32 & 267 \end{vmatrix}}{\begin{vmatrix} 64 & 8 & 1 \\ 256 & -16 & 1 \\ 1024 & 32 & 1 \end{vmatrix}} = \frac{414720}{27648} = 15$$

$$\therefore y = \frac{1}{4}x^2 - \frac{1}{8}x + 15$$