

### Quiz #3

① Solve by the square root property:

(a)  $4x^2 + 49 = 0$

(b)  $(x + \frac{3}{4})^2 = \frac{11}{16}$

② Solve by completing the square:

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

(b)  $8x^2 - 4x + 1 = 0$

③ Solve by the quadratic formula

(a)  $5x^2 + 8x = -3$

(b)  $\frac{x^2}{3} - x - \frac{1}{6} = 0$

④ Graph the following parabolas showing

- vertex
- x-intercepts (if any)
- y-intercept
- axis of symmetry

Label the axes and all the points

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

(b)  $f(x) = (x-1)^2 - 2$

4a)  $f(x) = -x^2 + 2x - 2$   
 parabola opens down  
 ( $a = -1 < 0$ )

• Vertex  $V(x_v, y_v)$   
 $x_v = \frac{-b}{2a} = \frac{-2}{2(-1)} = 1$   
 $y_v = -1 + 2 - 2 = -1$

$V(1, -1)$

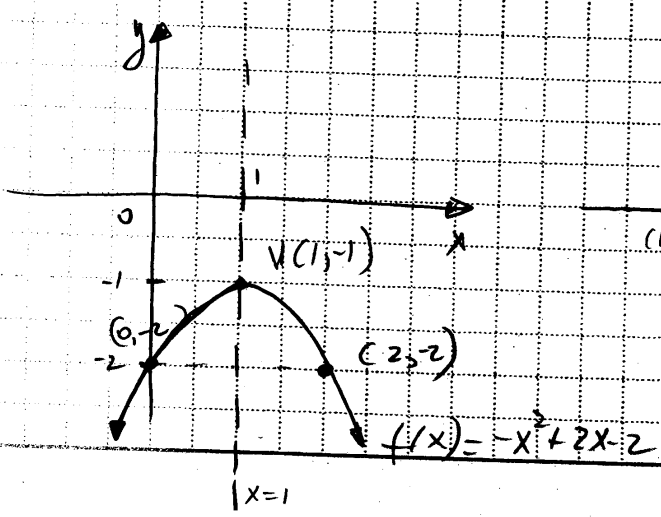
• y-n: if  $x=0, y=-2$

$(0, -2)$

• x-n: none

Note that  $V(1, -1)$   
 and parabola  
 opens downward  
 OR

Note that the eq.  
 $-x^2 + 2x - 2 = 0$   
 $x^2 - 2x + 2 = 0$   
 has  $\Delta = b^2 - 4ac < 0$   
 so no real solutions



4b)  $f(x) = (x-1)^2 - 2$   
 parabola opens up  
 ( $a = 1 > 0$ )

• Vertex  $V(1, -2)$   
 (the equation is in vertex form)

• y-n: if  $x=0,$   
 $y = (-1)^2 - 2 = -1$

$(0, -1)$

• x-n: if  $y=0,$

$$(x-1)^2 - 2 = 0$$

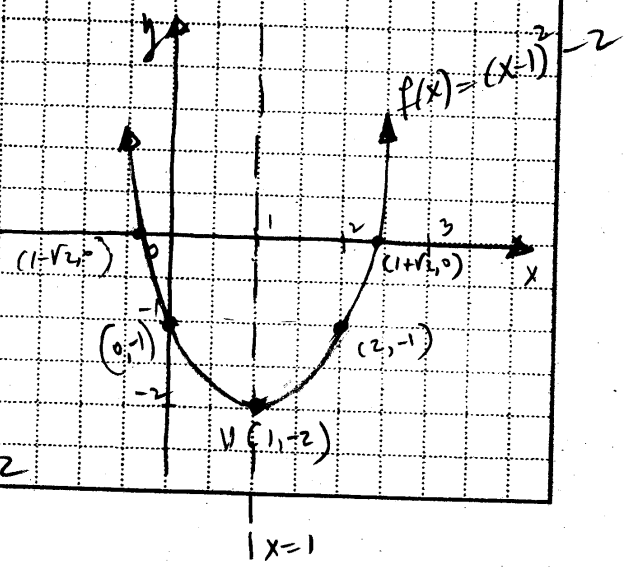
$$(x-1)^2 = 2$$

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

$$x-1 = \pm\sqrt{2}$$

$$x = 1 \pm \sqrt{2} \quad \left\{ \begin{array}{l} 1 + \sqrt{2} \approx 2.4 \\ 1 - \sqrt{2} \approx -0.4 \end{array} \right.$$

$(1 \pm \sqrt{2}, 0)$



# Quiz #3 - Solutions

(1) (a)  $4x^2 + 49 = 0$

$$4x^2 = -49$$

$$x^2 = \frac{-49}{4}$$

$$\sqrt{x^2} = \sqrt{\frac{-49}{4}}$$

$$\boxed{x = \pm \frac{7i}{2}}$$

$$x - \frac{1}{4} = \pm \frac{i}{4}$$

$$x = \frac{1}{4} \pm \frac{i}{4}$$

$$\boxed{x = \frac{1 \pm i}{4}}$$

(b)  $(x + \frac{3}{4})^2 = \frac{11}{16}$

$$\sqrt{(x + \frac{3}{4})^2} = \sqrt{\frac{11}{16}}$$

$$x + \frac{3}{4} = \pm \frac{\sqrt{11}}{4}$$

$$x = \frac{-3}{4} \pm \frac{\sqrt{11}}{4} \quad \boxed{x = \frac{-3 \pm \sqrt{11}}{4}}$$

(3) (a)  $5x^2 + 8x = -3$

$$5x^2 + 8x + 3 = 0$$

$$a=5, b=8, c=3$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$x = \frac{-8 \pm \sqrt{64 - 4(5)(3)}}{2(5)}$$

$$2(5)$$

$$x = \frac{-8 - 2}{10} = -1$$

$$x = \frac{-8 + 2}{10}$$

$$x = \frac{-8 + 2}{10} = \frac{-3}{5}$$

$$\boxed{x \in \{-1, \frac{-3}{5}\}}$$

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

$$x^2 + 2x = 5 \quad | +1$$

$$(\frac{1}{2} \text{ coef. } x)^2 = (\frac{1}{2} \cdot 2)^2 = 1$$

$$x^2 + 2x + 1 = 5 + 1$$

$$(x+1)^2 = 6$$

$$\sqrt{(x+1)^2} = \sqrt{6}$$

$$x+1 = \pm \sqrt{6}$$

$$\boxed{x = -1 \pm \sqrt{6}}$$

(b)  $\frac{x^2}{3} - x - \frac{1}{6} = 0 \quad | \cdot 6$

$$2x^2 - 6x - 1 = 0$$

$$a=2, b=-6, c=-1$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$x = \frac{-(-6) \pm \sqrt{(-6)^2 - 4(2)(-1)}}{2(2)}$$

$$x = \frac{6 \pm \sqrt{36 + 8}}{4} = \frac{6 \pm \sqrt{44}}{4}$$

$$= \frac{6 \pm 2\sqrt{11}}{4} = \frac{2(3 \pm \sqrt{11})}{4}$$

$$\boxed{x = \frac{3 \pm \sqrt{11}}{2}}$$

(b)  $8x^2 - 4x + 1 = 0$

$$8x^2 - 4x = -1 \quad | \div 8$$

$$x^2 - \frac{1}{2}x = \frac{-1}{8} \quad | + \frac{1}{16}$$

$$(\frac{1}{2} \text{ coef. } x)^2 = (\frac{1}{2} \cdot \frac{1}{2})^2 = \frac{1}{16}$$

$$x^2 - \frac{1}{2}x + \frac{1}{16} = \frac{-1}{8} + \frac{1}{16}$$

$$(x - \frac{1}{4})^2 = \frac{-1}{16}$$

$$\sqrt{(x - \frac{1}{4})^2} = \sqrt{\frac{-1}{16}}$$