

50/50 = 100

Intermediate Algebra - Math 0099
University of North Georgia
Fall 2015
Exam #3

Name: Key Date: November 30, 2015

1. **Convert** the following function: $T(x) = x^2 - 2x - 9$ to **Vertex Form** and find the following: (20 Points)

Vertex: $(1, -10)$

Axis of Symmetry: $x = 1$

How it opens: \uparrow

Type and Number of Solutions: 2 Real

y-Intercept: $(0, -9)$

x-Intercept(s): $x = 1 \pm \sqrt{10}$

$$x^2 - 2x = 9$$

$$a.) (-2) \cdot \frac{1}{2} = -1$$

$$b.) (-1)^2 = 1$$

$$(x-1)^2 = 9+1$$

$$(x-1)^2 - 10 = 0$$

$$T(x) = (x-1)^2 - 10$$

$$h = 1, k = -10$$

2. Show by **substitution** that the following: $x = \frac{1-i\sqrt{19}}{4}$ is a solution in $4x^2 - 2x + 5 = 0$ (5 points).

$$4 \left(\frac{1-i\sqrt{19}}{4} \right)^2 - 2 \left(\frac{1-i\sqrt{19}}{4} \right) + 5 = 0$$

$$4 \left(\frac{1-i\sqrt{19}}{4} \right) \left(\frac{1-i\sqrt{19}}{4} \right) - \frac{2 + 2i\sqrt{19}}{4} + 5 = 0$$

$$4 \left(\frac{1 - 2i\sqrt{19} - 19}{4} \right) - \frac{2 + 2i\sqrt{19}}{4} + 5 = 0$$

$$\begin{aligned} & (i\sqrt{19})(-i\sqrt{19}) \\ &= i^2 \cdot 19 \\ &= -1 \cdot 19 \\ &= -19 \end{aligned}$$

$$\frac{-18 - 2i\sqrt{19} - 2 + 2i\sqrt{19}}{4} + 5 = 0$$

$$-\frac{20}{4} + 5 = 0$$

$$-5 + 5 = 0$$

$$0 = 0 \checkmark$$

Solve using *the Square Root Property*. (4 points each)

3. $x^2 - 7 = 2$

$$x^2 = 9$$

$$\boxed{x = \pm 3}$$

ck

① $(3)^2 - 7 = 2$

$$9 - 7 = 2$$

$$2 = 2 \checkmark$$

② $(-3)^2 - 7 = 2$

$$9 - 7 = 2$$

$$2 = 2 \checkmark$$

4. $3(x - 5)^2 = 0$

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

$$x - 5 = \pm \sqrt{0} = 0$$

$$\boxed{x = 5}$$

ck

$$3(5 - 5)^2 = 0$$

$$3(0)^2 = 0$$

$$3(0) = 0$$

$$0 = 0 \checkmark$$

Solve using *Completing the Square*. (4 points)

5. $x^2 - x + 5 = 0$

$$x^2 - x = -5$$

$$a \quad -1 \cdot \frac{1}{2} = -\frac{1}{2}$$

$$b \quad (-\frac{1}{2})^2 = \frac{1}{4}$$

$$(x - \frac{1}{2})^2 = \frac{-5}{1} + \frac{1}{4} = \frac{-20 + 1}{4} = -\frac{19}{4}$$

$$(x - \frac{1}{2})^2 = -\frac{19}{4}$$

$$x - \frac{1}{2} = \pm \frac{\sqrt{19}}{2}$$

$$\boxed{x = \frac{1 \pm \sqrt{19}}{2}}$$

note: Discriminate $b^2 - 4ac$

$$(-1)^2 - 4(1)(5)$$

$$1 - 20$$

$$-19 < 0$$

→ 2 Complex Solutions

Solve using *the Quadratic Formula*. (4 points)

6. $-3x^2 + 5x - 1 = 0$

$$a = -3, \quad b = 5, \quad c = -1$$

$$x = \frac{-5 \pm \sqrt{(5)^2 - 4(-3)(-1)}}{2(-3)}$$

$$= \frac{-5 \pm \sqrt{25 - 12}}{-6}$$

$$= \frac{-5 \pm \sqrt{13}}{-6}$$

$$\boxed{x = \frac{5 \pm \sqrt{13}}{6}}$$

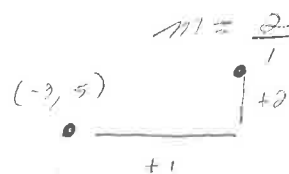
7. Find the equation of the line in **Standard Form** which is parallel to $y = 2x + 4$ and passing through $(-3, 5)$. (4 points)

$$y - 5 = 2(x + 3)$$

$$y - 5 = 2x + 6$$

$$-2x + y = 11$$

$$\boxed{2x - y = -11}$$



$$\rightarrow (-3 + 1, 5 + 2) = (-2, 7)$$

ck

$$2(-2) - 7 = -11$$

$$-4 - 7 = -11$$

$$-11 = -11 \checkmark$$

8. Given the equation: $5x - 9y = -22$, find the equation of the line **perpendicular** to the given equation traveling through $(-4, -5)$ and write your equation in **Standard Form**. (5 points)

$$5x - 9y = -22$$

$$-9y = -5x - 22$$

$$y = \frac{-5}{-9}x + \frac{-22}{-9}$$

$$y = \boxed{\frac{5}{9}}x + \frac{22}{9}$$

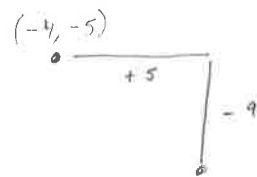
Perp $m = -\frac{9}{5}$

$$5(y + 5) = -\frac{9}{5}(x + 4)$$

$$5y + 25 = -9(x + 4)$$

$$5y + 25 = -9x - 36$$

$$9x + 5y = -61$$



$$\rightarrow (-4 + 5, -5 - 9)$$

$$(1, -14)$$

ck

$$9(1) + 5(-14) = -61$$

$$9 - 70 = -61$$

$$-61 = -61 \checkmark$$

#1.) x - Intercepts

$$(x-1)^2 - 10 = 0$$

$$(x-1)^2 = 10$$

$$x-1 = \pm \sqrt{10}$$

$$x = 1 \pm \sqrt{10}$$

Vertex check: $\left(-\frac{b}{2a}, f\left(-\frac{b}{2a}\right)\right)$

$$x = -\frac{b}{2a} = -\frac{-2}{2(1)} = \frac{2}{2} = 1$$

$$f(1) = (1)^2 - 2(1) - 9$$

$$= 1 - 2 - 9$$

$$= -1 - 9$$

$$= -10$$

$$(1, -10) \checkmark$$

Discriminate: $b^2 - 4ac$

$$(-2)^2 - 4(1)(-9)$$

$$4 + 36$$

$40 > 0 \rightarrow 2$ Real Solutions