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)

$x^2 - 2x = 9$

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

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

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

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

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

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

Vertex: $(1, -10)$

Axis of Symmetry: $x = 1$

How it opens: up

Type and Number of Solutions: 2 Real

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

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

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).

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

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

$$\cancel{4}\left(\frac{1 - 2i\sqrt{19} - 19}{\cancel{16}_4}\right) - \frac{2 + 2i\sqrt{19}}{4} + 5 = 0$$

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

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

$$-5 + 5 = 0$$

$$0 = 0 \checkmark$$

$(-i\sqrt{19})(-i\sqrt{19})$

$= i^2 \cdot 19$

$= -1 \cdot 19$

$= -19$

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

3. $x^2 - 7 = 2$

$x^2 = 9$

$\boxed{x = \pm 3}$

ck

① $(3)^2 - 7 = 2$

$9 - 7 = 2$

$2 = 2$ ✓

② $(-3)^2 - 7 = 2$

$9 - 7 = 2$

$2 = 2$ ✓

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

$(x-5)^2 = 0$

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

$\boxed{x = 5}$

ck

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

$3(0)^2 = 0$

$3(0) = 0$

$0 = 0$ ✓

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

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

$x^2 - x = -5$

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

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

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

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

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

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

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. $-3x^2 + 5x - 1 = 0$ $\quad a = -3, \; b = 5, \; c = -1$

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

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

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

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

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

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

$y - 5 = 2x + 6$

$-2x + y = 11$

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

$m = \frac{2}{1}$

$(-3, 5)$ → $+1$, $+2$

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

ck

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

$-4 - 7 = -11$

$-11 = -11$ ✓

8. Given the equation: $\mathbf{5x - 9y = -22}$, find the equation of the line ***perpendicular*** to the given equation traveling through $(\mathbf{-4, -5})$ and write you 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 $m = -\frac{9}{5}$

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

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

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

$9x + 5y = -61$

$(-4, -5)$ → $+5$, -9

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

$(1, -14)$

ck

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

$9 - 70 = -61$

$-61 = -61$ ✓

#1) x - Intercepts

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

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

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

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

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

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

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

$$= 1 - 2 - 9$$

$$= -1 - 9$$

$$= -10$$

$(1, -10)$ ✓

Discriminate: $b^2 - 4ac$

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

$$4 + 36$$

$40 > 0 \rightarrow$ 2 Real Solutions