

MATH 1010-4

QUIZ 13 SOLUTIONS

December 6, 2005

1. (7pts) Solve

(a) (3pts)  $x^2 - 10 = 0$

$$x^2 = 10$$

$$x = \sqrt{10} \text{ or } x = -\sqrt{10}$$

(b) (4pts)  $(x + 4)^2 + 5 = 0$

$$(x + 4)^2 = -5$$

$$x + 4 = \sqrt{5}i \text{ or } x + 4 = -\sqrt{5}i$$

$$x = -4 + \sqrt{5}i \text{ or } x = -4 - \sqrt{5}i$$

2. (11pts) Solve by completing the square

(a) (5pts)  $x^2 - 12x + 5 = 0$

$$x^2 - 2 \cdot 6x = -5$$

$$x^2 - 2 \cdot 6x + 6^2 = -5 + 6^2$$

$$(x - 6)^2 = 31$$

$$x - 6 = \sqrt{31} \text{ or } x - 6 = -\sqrt{31}$$

$$x = 6 + \sqrt{31} \text{ or } x = 6 - \sqrt{31}$$

(b) (6pts)  $\sqrt{4x + 4} = x + 1$

$$4x + 4 = (x + 1)^2$$

$$4x + 4 = x^2 + 2x + 1$$

$$3 = x^2 - 2x$$

$$3 + 1 = x^2 - 2 \cdot 1x + 1^2$$

$$4 = (x - 1)^2$$

$$x - 1 = 2 \text{ or } x - 1 = -2$$

$$x = 3 \text{ or } x = -1$$

Check:

$$\sqrt{4 \cdot 3 + 4} = \sqrt{16} = 4 \text{ and } 3 + 1 = 4, \text{ hence } 3 \text{ is the solution.}$$

$$\sqrt{4 \cdot (-1) + 4} = \sqrt{0} = 0 \text{ and } -1 + 1 = 0, \text{ hence } -1 \text{ is the solution, too.}$$

3. (7pts) The length of an L-shaped sidewalk is 70 yards. Domingo decides to cut diagonally across the grass, which makes his path 20 yards shorter. What are the lengths of the two legs of the sidewalk?

Let  $x$  denote the length of one side of the sidewalk. Then the other side has length  $70 - x$ . The length of the diagonal is  $70 - 20 = 50$ . Using the Pythagora's Theorem, get

$$x^2 + (70 - x)^2 = 50^2$$

$$x^2 + 4900 - 140x + x^2 = 2500$$

$$2x^2 - 140x = -2400$$

$$x^2 - 70x = -1200$$

$$x^2 - 2 \cdot 35 + 35^2 = -1200 + 1225$$

$$(x - 35)^2 = 25$$

$$x - 35 = 5 \text{ or } x - 35 = -5$$

$$x = 40 \text{ or } x = 30$$

One leg is 40 yards long, and the other is 30 yards long.