

**Quiz #1**

Math 130, Section 21, David Beydler

Name: Solution  
Wednesday, September 7, 2011**Directions:** Show all work to get full credit. No calculators, books, notes. Please box your answers. Good luck!  
(15 points total)1. (2 points) In the morning, you drive to work at 50 mph. Your average speed on the return trip in the afternoon is 40 mph. The return trip took  $\frac{1}{4}$  hr longer because of heavy traffic. How far did you travel to work?Let  $x =$  distance to work.

|           | Rate | Distance | Time           |
|-----------|------|----------|----------------|
| To work   | 50   | $x$      | $\frac{x}{50}$ |
| From work | 40   | $x$      | $\frac{x}{40}$ |

$$200 \left( \frac{x}{40} = \frac{x}{50} + \frac{1}{4} \right)$$

$$50x = 40x + 50$$

$$x = 50$$

50 miles

2. (2 points) You deposit some money at 5% interest, with twice as much deposited at 10%. Find the amount deposited at each rate if the total annual interest income is \$100.

Let  $x =$  amount deposited at 5% interest

| Rate | Deposit | Interest |
|------|---------|----------|
| 5%   | $x$     | $0.05x$  |
| 10%  | $2x$    | $0.2x$   |

↑  
(10%)(2x)

$$0.05x + 0.2x = 100$$

$$0.25x = 100$$

$$x = \frac{100}{0.25} = 400$$

\$400 at 5%  
 \$800 at 10%

3. (2 points) Solve the equation  $(3x - 1)^2 = 12$ 

$$3x - 1 = \pm \sqrt{12}$$

$$3x = 1 \pm \sqrt{12}$$

$$x = \frac{1 \pm \sqrt{12}}{3}$$

$$x = \frac{1 \pm 2\sqrt{3}}{3}$$

(This is fine, too)

$\left\{ \frac{1 \pm 2\sqrt{3}}{3} \right\}$

4. (2 points) Solve the equation  $x^2 - 4x = -10$

$$\begin{aligned}
 x^2 - 4x + 10 &= 0 \\
 x &= \frac{-(-4) \pm \sqrt{(-4)^2 - 4(1)(10)}}{2(1)} \\
 &= \frac{4 \pm \sqrt{16 - 40}}{2} \\
 &= \frac{4 \pm \sqrt{-24}}{2}
 \end{aligned}$$

$$\begin{aligned}
 &= \frac{4 \pm i\sqrt{24}}{2} \\
 &= \frac{4 \pm 2i\sqrt{6}}{2} \\
 &= 2 \pm i\sqrt{6}
 \end{aligned}$$

$\boxed{\{2 \pm i\sqrt{6}\}}$

5. (2 points) Solve  $V = \pi r^2 h$  for  $r$ .

$$r^2 = \frac{V}{\pi h}$$

$$r = \pm \sqrt{\frac{V}{\pi h}}$$

$\boxed{r = \pm \frac{\sqrt{V\pi h}}{\pi h}}$

6. (2 points) The sum of the squares of two consecutive integers is 61. Find the integers.

Let  $x =$  smaller #.

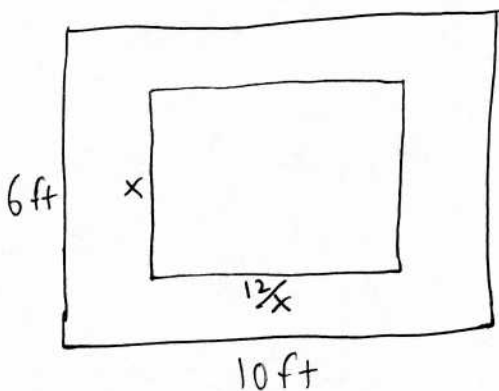
$$\begin{aligned}
 x^2 + (x+1)^2 &= 61 \\
 x^2 + x^2 + 2x + 1 &= 61 \\
 2x^2 + 2x - 60 &= 0 \\
 x^2 + x - 30 &= 0
 \end{aligned}$$

$$\begin{aligned}
 &\rightarrow (x+6)(x-5) = 0 \\
 &\quad \downarrow \quad \quad \downarrow \\
 &x = -6 \quad \quad x = 5
 \end{aligned}$$

$\boxed{-6 \text{ and } -5, \text{ or } 5 \text{ and } 6}$

7. (3 points) You want to buy a rug for a room that is 6 ft wide and 10 ft long. You want to leave a uniform strip of floor around the rug. You can afford to buy 12 ft<sup>2</sup> of carpeting. What dimensions should the rug have?

Let  $x =$  width of rug.



One way to calculate width of strip

Another way to calculate width of strip

$$\frac{6-x}{2} = \frac{10 - \frac{12}{x}}{2}$$

$$6-x = 10 - \frac{12}{x}$$

$$6x - x^2 = 10x - 12$$

$$x^2 + 4x - 12 = 0$$

$$(x+6)(x-2) = 0$$

$$x = -6 \quad \downarrow \quad x = 2$$

$\boxed{2 \text{ ft by } 6 \text{ ft}}$

$\uparrow$   
 $(\frac{12}{2})$