Math 001.10 **Quiz # 2** **Sem. I , Nov 4 , 2006**

Name : ______________________ **ID. # :** ______ **SER. # :** ____

1. Solve the equation $\dfrac{|x^2-4|-2}{5-|x^2-4|} - \dfrac{1}{2} = 0$

Ans. $\dfrac{|x^2-4|-2}{5-|x^2-4|} = \dfrac{1}{2} \implies 2|x^2-4|-4 = 5-|x^2-4| \implies 3|x^2-4| = 9$

$\implies |x^2-4| = 3 \implies x^2-4 = \pm 3 \implies x^2 = 4 \pm 3 = 1$ or $7 \implies x = \pm 1$ or $x = \pm\sqrt{7}$.

Thus S.S. $= \{-\sqrt{7}, -1, 1, \sqrt{7}\}$

2. Find k if the quadratic equation $x^2 + 2x + k = 1$ has two equal real roots.

Ans. The quadratic equation $x^2 + 2x + (k-1) = 0$ has two equal real roots when

$b^2 - 4ac = 0 \implies 4 - 4(1)(k-1) = 0 \implies 4 = 4(k-1) \implies k-1 = 1 \implies k = 2$

3. Solve for t if $m^2 s = \pi t^2 - 2mt$ (Hint: consider this equation as a quadratic equation in t)

Ans. We solve the equation $\pi t^2 - 2mt - m^2 s = 0$ for t, where $a = \pi$, $b = -2m$, $c = -m^2 s$.

So $t = \dfrac{-b \pm \sqrt{b^2-4ac}}{2a} = \dfrac{2m \pm \sqrt{4m^2 - 4(\pi)(-m^2 s)}}{2\pi} = \dfrac{2m \pm 2m\sqrt{1+\pi s}}{2\pi} = \dfrac{m \pm m\sqrt{1+\pi s}}{\pi}$

Math 001.26 **Quiz # 2** **Sem. I , Nov 4 , 2006**

Name : ______________________ **ID. # :** ______ **SER. # :** ____

1. Solve for x_1 if $\dfrac{y-y_1}{x-x_1} = \dfrac{y_2-y_1}{x_2-x_1}$

Ans. $(y-y_1)x_2 - (y-y_1)x_1 = (y_2-y_1)x - (y_2-y_1)x_1$

$\Longrightarrow (y_2-y_1)x_1 - (y-y_1)x_1 = (y_2-y_1)x - (y-y_1)x_2$

$\Longrightarrow (y_2-y)x_1 = (y_2-y_1)x - (y-y_1)x_2$

$\Longrightarrow x_1 = \dfrac{y_2x - y_1x - yx_2 + y_1x_2}{y_2-y}$

2. Find the solution set of the equations: (a) $-2|-x-1|-3=0$ (b) $|3x^2-21|=6$

Ans. (a) $-3 = 2|-x-1|$ is impossible, so S.S. $= \phi$

(b) $|3x^2-21|=6 \Longrightarrow 3x^2-21=\pm 6 \Longrightarrow x^2-7=\pm 2 \Longrightarrow x^2=9$ or $x^2=5$

$\Longrightarrow x=\pm 3$ or $x=\pm\sqrt{5} \Longrightarrow$ S.S. $=\{-3 , -\sqrt{5} , \sqrt{5} , 3\}$

3. Solve the quadratic equation $ax^2-3x+1=0$ whose discriminant is 1.

Ans. $b^2-4ac=1 \Longrightarrow 1=9-4(a)(1) \Longrightarrow 4a=8 \Longrightarrow a=2$. The equation is

$2x^2-3x+1=0 \Longrightarrow (2x-1)(x-1)=0 \Longrightarrow x=\dfrac{1}{2}$ or $x=1 \Longrightarrow$ S.S. $=\left\{\dfrac{1}{2} , 1\right\}$

Math 001.34 **Quiz # 2** **Sem. I , Nov 4 , 2006**

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1. Solve the equation $3|2x-1|+5 = 15-2|2x-1|$

   Ans. $5|2x-1| = 10 \implies |2x-1| = 2 \implies 2x-1 = \pm 2 \implies 2x = 3$ or $2x = -1$

   $\implies x = \frac{3}{2}$ or $x = -\frac{1}{2} \implies$ S.S. $= \left\{-\frac{1}{2}, \frac{3}{2}\right\}$

2. Find the value of k if the equation $2x^2 + kx + x = -2$ has two equal real roots.

   Ans. The quadratic equation $2x^2 + (k+1)x + 2 = 0$ has two equal real roots when

   $b^2 - 4ac = 0 \implies (k+1)^2 - 4(2)(2) = 0 \implies (k+1)^2 = 16 \implies k+1 = \pm 4$

   $\implies k = \pm 4 - 1 \implies k = 3$ or $k = -5$

3. Find the area of a right triangle whose sides are of length x , $x+2$, and $x+4$ cm.

   Ans: Let $x+4$ be the length of the longest side (hypotenuse) and the other two sides be of length $x+2$ and x. By

   Pythagorean Theorem $(x+4)^2 = (x+2)^2 + x^2 \implies x^2 + 8x + 16 =$

   $x^2 + 4x + 4 + x^2 \implies x^2 - 4x - 12 = 0 \implies (x-6)(x+2) = 0$

   $\implies x = 6$ or $x = -2$ (rejected, because $x > 0$).

   Therefore the sides are of length 10 , 8 and 6 cm.

   The area $= \frac{1}{2}$ (base)(height) $= \frac{1}{2}(8)(6) = 24$ cm^2