Test #2, Math 115

Oct 17th, 2006

Name:_____

Direction: Please *print* your name. And show your work for credit. No work=No credit.

1. Solve the following quadratic equation use any way you like.(10 points)

$2x^2 - 8x + 3 = 0$

$x = \frac{-b \pm \sqrt{b^2-4ac}}{2a}$

$= \frac{8 \pm \sqrt{64-4\times2\times3}}{2\times2}$

$= \frac{8 \pm \sqrt{40}}{4} = \frac{8 \pm 2\sqrt{10}}{4} = \frac{4 \pm \sqrt{10}}{2}$

or

$2(x^2-4x)+3$

$2(x^2-4x+4)-8+3=0$

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

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

$(x-2)^2=\frac{5}{2}$

$x-2=\pm\sqrt{\frac{5}{2}}$

$x=2\pm\frac{\sqrt{10}}{2}$

2. Solve the following equation use any way you like.(10 points)

$\sqrt{x-4}+x=4$

$\sqrt{x-4}=-x+4$

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

$x-4=16-8x+x^2$

$x^2-9x-20=0 \Rightarrow (x-4)(x-5)=0$

$x=4$ or $x=5$

plug in and check

only $x=4$ is a solution.

3. For the following equation of a circle find the center and the radius.(10 points)

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

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

$(x+1)^2+(y-2)^2=3$

$(x+1)^2+(y-2)^2=(\sqrt{3})^2$

center : $(-1,2)$

radius : $\sqrt{3}$

4. Find the equation of the straight line that passes $(1,2)$ and perpendicular to $2y - x = 4$.(10 points)

$2y - x = 4 \Rightarrow 2y = x + 4 \Rightarrow y = \frac{1}{2}x + 2$, $m = \frac{1}{2}$

So $m' = -2$

$$(y-2) = m'(x-1)$$

$$y - 2 = -2(x-1)$$

$$y = -2x + 4$$

5. Find the equation of the straight line that passes $(1,1)$ and $(4,3)$. Show your answer in the "solpe-intercept" form.(10 points)

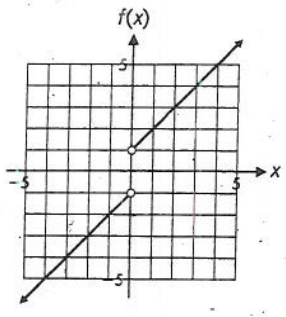
$$m = \frac{3-1}{4-1} = \frac{2}{3}$$

$$(y-1) = \frac{2}{3}(x-1)$$

$$(y-1) = \frac{2}{3}x - \frac{2}{3}$$

$$y = \frac{2}{3}x + \frac{1}{3}$$

6. For the following graph of function find the domain and the range.(10 points)



Domain : $(-\infty, 0) \cup (0, \infty)$

Range : $(-\infty, -1) \cup (1, \infty)$

7. For the quadratic function $f(x) = -2x^2 + 12x - 20$, find the vertex, axis and sketch the graph.(10 points)

$$f(x) = -2(x^2 - 6x) - 20$$

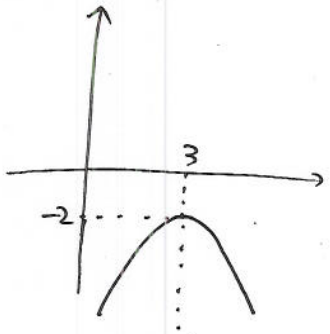
$$= -2(x^2 - 6x + 9 - 9) - 20$$

$$= -2(x-3)^2 + 18 - 20$$

$$= -2(x-3)^2 - 2$$

Vertex $(3, -2)$

axis : $x = 3$

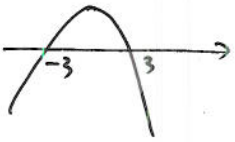


8. For $f(x) = \sqrt{36 - x^2}$ and $g(x) = 2x$, find $(f \circ g)(x)$ and its domain.(10 points for $(f \circ g)$,10 points for domain)
Hint: Solve a quadratic inequality to find the domain.

$(f \circ g)(x) = f(g(x)) = \sqrt{36 - (2x)^2} = \sqrt{36 - 4x^2}$

Domain: $36 - 4x^2 \geq 0$

$-4(x-3)(x+3) \geq 0$ intercepts: $\{3, -3\}$



$\Rightarrow -3 \leq x \leq 3$

Hence, domain of $f \circ g$ is $-3 \leq x \leq 3$ or $[-3, 3]$

9. Divide, using long division or synthetic division. Indicate the quotient and the remainder.(10 points)

$$(3x^3 + 2x^2 + 20) \div (x + 2)$$

$$\begin{array}{r} 3x^2 - 4x + 8 \\ x+2 \overline{)\,3x^3 + 2x^2 + 0x + 20} \\ 3x^3 + 6x^2 \\ \hline -4x^2 + 0x \\ -4x^2 - 8x \\ \hline 8x + 20 \\ 8x + 16 \\ \hline 4 \end{array}$$

Quotient: $3x^2 - 4x + 8$

Remainder: 4

$x + 2 = x - r \Rightarrow r = -2$

$$\begin{array}{r|cccc} & 3 & 2 & 0 & 20 \\ & & -6 & 8 & -16 \\ \hline -2 & 3 & -4 & 8 & 4 \end{array}$$

Quotient: $3, -4, 8$ remainder: 4

Quotient: $3x^2 - 4x + 8$

Remainder: 4