MAC 2311 - Period: ____ Name: KEY
Quiz 1 - Form A Please write your name and form on your paper.
August 31, 2015 **Show your work to earn full credit.**

1. Find the exact value of $\sin 2\theta$ given that $\tan\theta = \frac{15}{8}$ where $\pi < \theta < \frac{3\pi}{2}$. (*2 points*)

2. Complete the square of $y = 4x^2 - 8x + 11$ and find the minimum or maximum value of the function. (*2 points*)

3. Solve for x and express your answer as an interval: $\frac{x^2}{x+12} \leq 6$. (*2 points*)

MAC 2311 - Period: ____ Name: _____
Quiz 1 - Form B Write your name and form on both sheets of paper.
August 31, 2015 **Show your work to earn full credit.**

1. Find the exact value of $\cos 2\theta$ given that $\tan\theta = \frac{15}{8}$ where $\pi < \theta < \frac{3\pi}{2}$. (*2 points*)

2. Complete the square of $y = 3x^2 - 12x - 8$ and find the minimum or maximum value of the function. (*2 points*)

3. Solve for x and express your answer as an interval: $\frac{x^2}{x+6} \leq 3$. (*2 points*)

MAC 2311 - Period: ____ Name: _____
Quiz 1 - Form C Write your name and form on both sheets of paper.
August 31, 2015 **Show your work to earn full credit.**

1. Find the exact value of $\sin 2\theta$ given that $\tan\theta = -\frac{4}{3}$ where $\frac{\pi}{2} < \theta < \pi$. (*2 points*)

2. Complete the square of $y = 3x^2 + 6x - 9$ and find the minimum or maximum value of the function. (*2 points*)

3. Solve for x and express your answer as an interval: $\frac{x^2}{x+18} \leq 9$. (*2 points*)

MAC 2311 - Period: ____ Name: _____
Quiz 1 - Form D Write your name and form on both sheets of paper.
August 31, 2015 **Show your work to earn full credit.**

1. Find the exact value of $\cos 2\theta$ given that $\tan\theta = -\frac{4}{3}$ where $\frac{\pi}{2} < \theta < \pi$. (*2 points*)

2. Complete the square of $y = 4x^2 + 16x - 4$ and find the minimum or maximum value of the function. (*2 points*)

3. Solve for x and express your answer as an interval: $\frac{x^2}{x+4} \leq 2$. (*2 points*)

Problem References:
1. Section 1.4 #26 and Webassign HW 1 #25.
2. Section 1.2 #34,38 and Webassign HW 1 #1.
3. Section 1.1 #24,25 and Webassign HW 1 #4.

Form A

/6

① $\tan\theta = \frac{15}{8}$ and $\tan\theta = \frac{y}{x} \Rightarrow |y| = 15,\ |x| = 8.$

$\pi < \theta < \frac{3\pi}{2} \Rightarrow y = -15,\ x = -8.$ (½) (½) Also, $r = \sqrt{x^2+y^2} = 17$

(½)

$$\sin 2\theta = 2\sin\theta\cos\theta = 2\left(\frac{y}{r}\right)\left(\frac{x}{r}\right) = \frac{2(-15)(-8)}{(17)(17)} = \boxed{\frac{240}{289}}$$ (½)

② $y = 4x^2 - 8x + 11$

vertex coords: $h = -\frac{b}{2a} = -\frac{(-8)}{2(4)} = 1.$ (½)

(½) for work.

$k = y(1) = 4(1)^2 - 8(1) + 11 = 7$ (½)

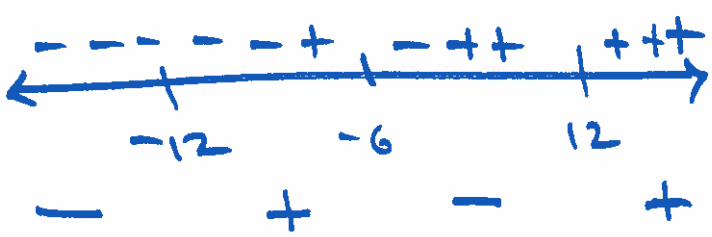
Thus, $y = a(x-h)^2 + k = 4(x-1)^2 + 7.$ $\boxed{\text{Minimum value } y = 7}$ (½)

③ $$\frac{x^2}{x+12} \le 6 \iff \frac{x^2}{x+12} - 6 \le 0$$

(1 pt) for work

$$\iff \frac{x^2 - 6(x+12)}{x+12} \le 0$$

$$\iff \frac{(x-12)(x+6)}{x+12} \le 0.$$



x must be on the interval $\boxed{(-\infty, -12) \cup [-6, 12]}$. (½) (½)

Form B

/6

① Since $\tan\theta = \frac{y}{x}$, $|y| = 15$, $|x| = 8$. $\pi < \theta < \frac{3\pi}{2} \Rightarrow y = -15$, $x = -8$. (1/2) (1/2)

Using $r = \sqrt{x^2+y^2} = 17$.

$\cos 2\theta = 1 - 2\sin^2\theta = 1 - 2\left(\frac{-15}{17}\right)^2 = \frac{17^2 - 2(15)^2}{17^2} = \boxed{\frac{-161}{289}}$ (1/2) (1/2)

② $3x^2 - 12x - 8$. vertex coords: $h = -\frac{b}{2a} = -\frac{(-12)}{2(3)} = 2$ (1/2)

(1/2) for work

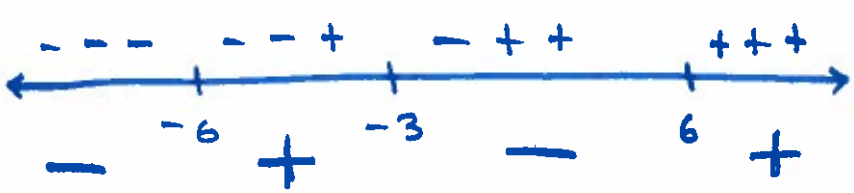
$k = y(h) = 3(2)^2 - 12(2) - 8 = -20$. (1/2)

$y = a(x-h)^2 + k = 3(x-2)^2 - 20$. $\boxed{\text{Minimum value of } y = -20.}$ (1/2)

③ $\frac{x^2}{x+6} \le 3 \iff \frac{x^2}{x+6} - 3 \le 0$

(1 pt for work) $\iff \frac{x^2 - 3(x+6)}{x+6} \le 0$

$\iff \frac{(x-6)(x+3)}{x+6} \le 0$.



$x-6$: $\begin{cases} \text{negative if } x < 6 \\ \text{positive if } x > 6 \end{cases}$

$x+3$: $\begin{cases} \text{negative if } x < -3 \\ \text{positive if } x > -3 \end{cases}$

$x+6$: $\begin{cases} \text{negative if } x < -6 \\ \text{positive if } x > -6 \end{cases}$

Since we want ≤ 0 to hold we have that x must be on the interval $\boxed{(-\infty, -6) \cup [-3, 6]}$. (1/2) (1/2)

Form C: /6

① $\left.\begin{array}{l}\tan\theta = \frac{y}{x} \\ \frac{\pi}{2} < \theta < \pi\end{array}\right\} \Rightarrow \begin{array}{l} y = 4 \quad ½ \\ x = -3 \quad ½\end{array} \Rightarrow r = \sqrt{3^2+4^2} = 5$

½

$\sin 2\theta = 2\sin\theta\cos\theta = 2\left(\frac{4}{5}\right)\left(-\frac{3}{5}\right) = \boxed{\frac{-24}{25}}$ ½

② $y = 3x^2 + 6x - 9$

½ for work.

vertex coords: $h = -\frac{b}{2a} = -\frac{6}{2(3)} = -1$ ½

$k = y(-1) = -12$ ½

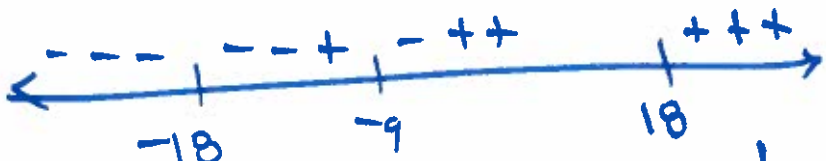
$y = a(x-h)^2 + k = 3(x+1)^2 - 12 \Rightarrow$ $\boxed{\text{Minimum value of } y = -12}$ ½

③ $\frac{x^2}{x+18} \le 9 \iff \frac{x^2}{x+18} - 9 \le 0$

$\iff \frac{x^2 - 9(x+18)}{x+18} \le 0$

1 for work.

$\iff \frac{(x-18)(x+9)}{x+18} \le 0$



$-$ $+$ $-$ $+$ ½ ½

We want ≤ 0, so $\boxed{(-\infty, -18) \cup [-9, 18]}$

Form D: /6

① $\left.\begin{array}{l}\tan\theta = \frac{y}{x} \\ \frac{\pi}{2} < \theta < \pi\end{array}\right\} \Rightarrow y = +4,\ x = -3. \Rightarrow r = \sqrt{3^2+4^2} = 5.$ (1/2) (1/2)

$\cos 2\theta = \cos^2\theta - \sin^2\theta = \left(-\frac{3}{5}\right)^2 - \left(\frac{4}{5}\right)^2 = \boxed{\frac{-7}{25}}$ (1/2) (1/2)

② $y = 4x^2 + 16x - 4$

(1/2) for work

Vertex coords: $h = -\left(\frac{b}{2a}\right) = \frac{-16}{2(4)} = -2$ (1/2)

$k = y(-2) = -20.$ (1/2)

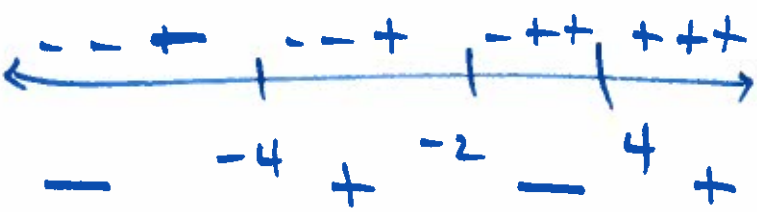
$y = a(x-h)^2 + k = 4(x+2)^2 - 20 \Rightarrow$ $\boxed{\text{Minimum value } y = -20}$ (1/2)

③ $\frac{x^2}{x+4} \le 2 \iff \frac{x^2}{x+4} - 2 \le 0$

$\iff \frac{x^2 - 2(x+4)}{x+4} \le 0$

$\iff \frac{(x-4)(x+2)}{x+4} \le 0$

(1) for work.



Since we want ≤ 0, $\boxed{(-\infty, -4) \cup [-2, 4].}$ (1/2) (1/2)