MATH 135: Quiz 1

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September 9, 2014

Name: Solutions Sec: _____

/4 **1.** Solve the following absolute value inequality and graph the result on the number line below.

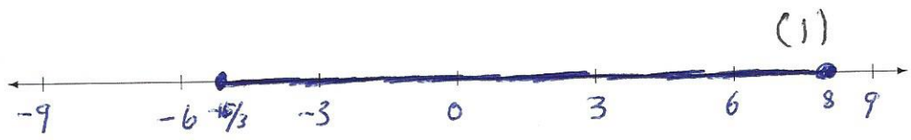
$$|3x - 4| \leq 20$$

$3x - 4 \leq 20$ and $-(3x-4) \leq 20$ (1)

$3x \leq 24$ $\quad -3x + 4 \leq 20$

$x \leq 8$ (1) $\quad -3x \leq 16$ (1)

$x \geq -16/3 = -5\,1/3$



/2 **2.** Given the two functions f and g below, find both the composites $f \circ g$ and $g \circ f$. Make sure they are labeled carefully.

$$f(x) = \tan(x+1) \qquad g(x) = x^2 + 3$$

$f \circ g(x) = f(g(x)) = f(x^2+3)$

$\boxed{f \circ g(x) = \tan((x^2+3)+1) = \tan(x^2+4)}$ (1)

$g \circ f(x) = g(f(x)) = g(\tan(x+1))$

$\boxed{g \circ f(x) = (\tan(x+1))^2 + 3}$ (1)

3. (x_1, y_1) (x_2, y_2)

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(a) Find the equation of the line that passes through the points $(1, 4)$ and $(-1, 0)$.

(b) Find the equation of the line perpendicular to the one in (a) that also passes through $(-1, 0)$.

(a) $\text{slope} = \frac{y_1 - y_2}{x_1 - x_2} = \frac{4-0}{1-(-1)} = 4/2 = 2 =: m_a$ (1)

Using Point-slope form for the equation:

$y - y_1 = m_a(x - x_1)$ (1)

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

$\boxed{y = 2x + 2}$ or $\boxed{2x - y + 2 = 0}$

(b) If this line is perpendicular to the line in (a), then

$m_a \cdot m_b = -1 \Rightarrow 2 \cdot m_b = -1 \Rightarrow m_b = -1/2$ (1)

Then, using point-slope form again:

$y - y_2 = m_b(x - x_2)$

$y - 0 = (-1/2)(x + (+1))$ (1)

$\boxed{y = -1/2\,x - 1/2}$ or $\boxed{1/2\,x + y + 1/2 = 0}$

$\boxed{x + 2y + 1 = 0}$