Math 32 Warm-up Quiz

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Thursday, September 16, 2008

Name: _____ Score: /10

You have twenty minutes to complete this quiz. You may not use calculators or notes, but the chalkboards are yours.

1. (2 pts) Simplify $|x-5|+|x-9|$, where x is some number such that $5 < x < 9$.

   If $x > 5$, then $x-5$ is positive, so $|x-5| = x-5$. If $x < 9$, then $x-9$ is negative, so $|x-9| = -(x-9) = 9-x$. Thus, if $5 < x < 9$, then $|x-5|+|x-9| = (x-5)+(9-x) = 4$.

2. (3 pts) Solve the equation for x:

$$\frac{2}{x-3} - \frac{1}{x+3} = \frac{10}{x^2-9}$$

   We mulitply both sides by $x^2 - 9 = (x-3)(x+3)$. Then the equation becomes $2(x+3) - 1(x-3) = 10$. Simplifying and being careful about $+$s and $-$s, this is $2x - x + 6 + 3 = 10$, i.e. $x = 1$. So this is the only possible solution; we plug $x = 1$ back into the original equation to make sure it's not extraneous, and find $2/(-2) - 1/(4) = 10/(-8)$, which is correct.

3. Let $P = (2, 3)$ and $Q = (10, 9)$.

(a) (1 pt) Find the distance between P and Q.
$\sqrt{(10-2)^2 + (9-3)^2} = \sqrt{8^2 + 6^2} = \sqrt{64 + 36} = \sqrt{100} = \boxed{10}$.

(b) (1 pt) Find the midpoint of the line-segment joining P and Q.
$M = \left(\frac{2+10}{2}, \frac{3+9}{2}\right) = \boxed{(6, 6)}$

(c) (1 pt) Find the slope of the line joining P and Q.
$m = \frac{9-3}{10-2} = \frac{6}{8} = \boxed{\frac{3}{4}}$

(d) (2 pts) Write an equation for the line joining P and Q.

$$\begin{aligned} y - y_0 &= m(x - x_0) \\ y - 3 &= \frac{3}{4}(x - 2) \\ y &= \frac{3}{4}x - \frac{3}{2} + 3 \\ y &= \frac{3}{4}x + \frac{3}{2} \end{aligned}$$