Practice Quiz on Prerequisites
Calculus

1. Write the equation of the line that goes through (4, -1) and is parallel to $3x + 4y = 12$.

$$y - 1 = -\frac{3}{4}(x - 4)$$
$$y + 1 = -\frac{3}{4}x + 3 \qquad \boxed{y = -\frac{3}{4}x + 2}$$

$4y = 12 - 3x$
$y = 3 - \frac{3}{4}x$
$M = -\frac{3}{4}$

2. Solve for x: $|2x - 4| = 4 - 2x$. Write in interval form.

$$2x - 4 < 0$$
$$2x < 4 \qquad x < 2 \qquad \boxed{(-\infty, 2)}$$

3. For which values of x is $|x^2 - 5x + 6| = x^2 - 5x + 6$? Write in interval form.

$$x^2 - 5x + 6 \geq 0$$
$$(x - 2)(x - 3)$$

$$\boxed{(-\infty, 2] \cup [3, \infty)}$$

4. Find all values of x for which the given expression yields a real number:

$$\sqrt{x^2 + 7x + 12}$$

$x^2 + 7x + 12 \geq 0$
$(x + 4)(x + 3)$

$$\boxed{(-\infty, -4] \cup [3, \infty)}$$

5. Solve the inequality and write in interval form: $x^2 < 25$

$$\boxed{(-5, 5)}$$

$x^2 - 25 < 0$
$(x + 5)(x - 5) < 0$

6. Find the exact values of all six trigonometric functions of θ if $\cot \theta = \frac{2}{5}$ $0 \leq \theta \leq \frac{\pi}{2}$

$\cot \theta = \frac{adj}{opp}$

$c = \sqrt{29}$ $5^2 + 2^2 = c^2$
$25 + 4 = c^2$
$c = \sqrt{29}$

$\sin \theta = \frac{5}{\sqrt{29}}$ $\csc \theta = \frac{\sqrt{29}}{5}$
$\cos \theta = \frac{2}{\sqrt{29}}$ $\sec \theta = \frac{\sqrt{29}}{2}$
$\tan \theta = \frac{5}{2}$ $\cot \theta = \frac{2}{5}$

7. Find the value of all six trigonometric functions of θ using the unit circle if:

a) $\theta = -\frac{\pi}{3}$ $-\frac{\pi}{3} + \frac{6\pi}{3}$ $-\frac{\sqrt{3}}{2}$

b) $\theta = \frac{5\pi}{2}$ $\frac{5\pi}{2} - \frac{4\pi}{2} = \frac{\pi}{2}$

$\sin \theta = -\frac{\sqrt{3}}{2}$ $\csc \theta = -\frac{2}{\sqrt{3}}$
$\cos \theta = \frac{1}{2}$ $\sec \theta = 2$
$\tan \theta = -\sqrt{3}$ $\cot \theta = -\frac{1}{\sqrt{3}}$

$\sin \theta = 1$ $\csc \theta = 1$
$\cos \theta = 0$ $\sec \theta = $ undef
$\tan \theta = $ undef $\cot \theta = 0$

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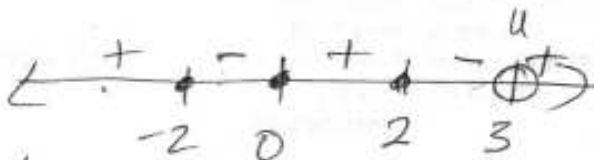$x^2 - x - 12$

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

8. Write as a piecewise function: $f(x) = x^2 - x - 12$

$$f(x) = \begin{cases} x^2 - x - 12, & x^2 - x - 12 \geq 0 \\ -x^2 + x + 12, & x^2 - x - 12 < 0 \end{cases}$$

$$f(x) = \begin{cases} x^2 - x - 12, & (-\infty, 3] \cup [4, \infty) \\ -x^2 + x + 12, & (-3, 4) \end{cases}$$

9. Solve and write the solution for x in interval form: $\dfrac{x^3 - 4x}{x-3} \leq 0$

$$\frac{x(x^2-4)}{x-3} \leq 0 \qquad \frac{x(x+2)(x-2)}{x-3} \leq 0$$

$$[-2, 0] \cup [2, 3)$$

Answers for #10 and #11:

10. a) $x^2 - 10x + 23$ b) -6

11. a) $f(x) = \dfrac{4}{x^2}$ b) $g(x) = x - 6$