MAT1318X - Assignment 1 - Summer 2012 - Instructor Charles Starling

This assignment **must be printed out and filled in** and is due July 13.

Name:_____ **Student Number:**_____

1. Reply true or false:
   (a) $-\frac{4}{7} = \frac{-4}{7} = \frac{4}{-7}$ ☐.
   (b) $-\left(\frac{1}{2}\right)^2 = \frac{1^2}{(-2)^2}$ ☐.
   (c) $\frac{2^3}{5^4} = \frac{\not{2}^3}{\not{5}^4} = \frac{3}{4}$ ☐.
   (d) $\frac{5}{6} \div \frac{3}{5} = 2$ ☐.
   (e) $(-\infty, 5) \cup (5, \infty) = \{x \in \mathbb{R} \mid x \neq 5\}$ ☐.
   (f) $3 \notin \mathbb{Q}$ ☐.
   (g) $\sqrt{(-2)^2} = 2$ ☐.
   (h) $(1, 5) \cup (2, \infty) = (1, \infty)$ ☐.
   (i) $\sqrt{1+1} = \sqrt{1} + \sqrt{1}$ ☐.
   (j) $|1 - x| = |1| - |x|$ ☐.
   (k) $\frac{5+a}{3+a} = \frac{10+\not{a}}{3+\not{a}} = \frac{1}{2}$ ☐.
   (l) $x^2 = \frac{1}{(x)^{-2}}$ ☐.

2. Complete the following calculations:
   (a) $\frac{2}{5} + \frac{1}{2} = \frac{2 \cdot \square}{5 \cdot \square} + \frac{1 \cdot \square}{2 \cdot \square} = \frac{2 \cdot \square + 1 \cdot \square}{5 \cdot \square} = \frac{\square}{\square}$
   (b) $3 + \frac{1}{3} = \frac{\square}{3} + \frac{1}{3} = \frac{9+1}{\square} = \frac{\square}{\square}$
   (c) $4 - \frac{1}{9} = \frac{4 \cdot \square}{9} - \frac{1}{9} = \frac{\square - \square}{9} = \frac{\square}{\square}$
   (d) $\left(\frac{1}{5}\right)^{-2} = \left(\frac{\square}{\square}\right)^2 = \square$

3. Fill in the boxes with $\cap, \cup, \subset, \in$, or $\notin$.
   - $(-\infty, 5) \square [-3, \infty) = [-3, 5)$.
   - $2012 \square \mathbb{Z}$.
   - $\{2, 3, 4\} \square \{4, 5, 6\} = \{4\}$.
   - $\{-1, -\frac{2012}{3}, 0, \sqrt{2}\} \square \mathbb{Q} = \{-1, -\frac{2012}{3}, 0\}$.
   - $(-2, -4) \square \mathbb{R} = \mathbb{R}$.
   - $5 \square \mathbb{Q}$
   - $\{\sqrt{5}\} \square \mathbb{R}$
   - $\frac{1}{2012} \square \mathbb{Q}$.

4. Simplify the following expressions (show your work):

(a) $$\cfrac{1}{1+\cfrac{2}{1+\cfrac{1}{1+\cfrac{3}{1}}}} =$$

(b) $$\frac{2x}{x+3} + \frac{1}{x(x^2-2)} =$$

(c) $$\frac{1}{2-\sqrt{5}} =$$

5. Solve the inequality $1 + |x - 5| \leq 17$.

6. (a) Solve the inequality $x^2 - x - 5 > 0$ by following these steps:

   i. Use the quadratic formula to find the solutions to $x^2 - x - 5 = 0$, and use these values to factor the quadratic.

   ii. Draw a sign table using the values you found in (i).

   iii. Find the solution set.

   (b) Use a sign table to solve the inequality

$$\frac{(x-2)(x-1)}{x+1} \geq 0.$$

7. Let

(a) $f(x) = \sqrt{x-4}$.

(b) $g(x) = \dfrac{1}{4\sqrt{x}}$

(c) $h(x) = \dfrac{x+5}{x-3}$

(d) $k(x) = \dfrac{1}{|x|+3}$

(e) $s(x) = \sqrt{x^2 - x - 12}$

(f) $p(x) = \dfrac{1}{x^2+7}$

I) Find the domain of each function.

II) Find $k \circ g(2)$, $p \circ k(0)$ and $p \circ f(x)$.

III) Find the inverse function of h.