MAT 104 Quiz 18

Friday, October 29, 2004

1. Find the domain of
$$f(x) = \frac{3x^2 - x}{x^2 + x - 6}$$

   The domain is the set of permissible input values for the function. The only problem we should have in this function is the fact that we could potentially divide by 0. This occurs when $x^2 + x - 6 = 0$. Solving this quadradic equation gives us $x = -3$ or $x = 2$. So the domain is everything *except* these two points. So the domain is
$$\{x \mid x \neq -3 \text{ or } x \neq 2\}$$

2. Simplify
$$\frac{2x^2 - 3x - 2}{x^2 - 4}$$

   To simplify, we factor the polynomials and cancel common factors.
$$\begin{aligned} \frac{2x^2 - 3x - 2}{x^2 - 4} &= \frac{(2x+1)(x-2)}{(x+2)(x-2)} \\ &= \frac{2x+1}{x+2} \end{aligned}$$

3. Simplify
$$\frac{2x^2 + 3x - 2}{x - 2} \div \frac{x^2 + 5x + 6}{x^2 - 4}$$

$$\begin{aligned} \frac{2x^2 + 3x - 2}{x - 2} \div \frac{x^2 + 5x + 6}{x^2 - 4} &= \frac{2x^2 + 3x - 2}{x - 2} \cdot \frac{x^2 - 4}{x^2 + 5x + 6} \\ &= \frac{(2x-1)(x+2)}{x-2} \cdot \frac{(x+2)(x-2)}{(x+2)(x-2)} \\ &= \frac{(2x-1)(x+2)(x+2)(x-2)}{(x-2)(x+2)(x-2)} \\ &= \frac{(2x-1)(x+2)}{(x-2)} \end{aligned}$$