Example 3: Multiply and Divide Rational Expressions

Simplify. Identify the non-permissible values.

$$\frac{x^2+4x-32}{x^2+3x-40}\cdot\frac{3x^2-75}{3x^2-11x-4}\div\frac{6x^2+18x-60}{4x-x^3}$$

$$=\frac{(x+8)(x-4)}{(x+8)(x-5)}\cdot\frac{3(x^2-25)}{(3x+1)(x-4)}\div\frac{6(x^2+3x-10)}{x(4-x^2)}$$

$$=\frac{(x+8)(x-4)}{(x+8)(x-5)}\cdot\frac{3(x-5)(x+5)}{(3x+1)(x-4)}\div\frac{6(x+5)(x-2)}{x(2-x)(2+x)}$$

$$=\frac{(x+8)(x-4)}{(x+8)(x-5)}\cdot\frac{3(x-5)(x+5)}{(3x+1)(x-4)}\cdot\frac{x(2-x)(2+x)}{6(x+5)(x-2)}$$

(-1) over $(2-x)$; 2 over 6

$$=\frac{-x(x+2)}{2(3x+1)};\ x\neq -8,\pm 5,-\frac{1}{3},4,\pm 2$$