3/6

Simplify the rational expressions

1) $\frac{36y^3}{63y^5} = \frac{4 \cdot 9 \cdot y \cdot y \cdot y}{7 \cdot 9 \cdot y \cdot y \cdot y \cdot y \cdot y} = \frac{4}{7y^2}$

2) $\frac{2y - 4y^2}{10y - 5} = \frac{2y(1-2y)}{5(2y-1)} = -\frac{2y}{5}$ (opposites so introduce −)

3) $\frac{18 - 9x}{x - 2} = \frac{9(2-x)}{x-2} = -\frac{9}{1} = -9$ (opposites so introduce −)

4) $\frac{x^2 - 8x + 12}{x^2 - 4} = \frac{(x-6)(x-2)}{(x-2)(x+2)} = \frac{x-6}{x+2}$

Looking at our answer for number 4, what happens when

$x = -2$

$\frac{(-2)-6}{-2+2} = \frac{-8}{0} = ?$ Your calculator cannot divide by 0.

So x can be any number so long as it doesn't make the denominator 0.

Limitations on the Domain of an Algebraic Expression

(**Domain** means, "acceptable values for x".)

1. No value is allowed in the domain that causes the denominator to be zero.

Only for Fractions

Consider $\frac{3x}{2x-8}$

$2x - 8 = 0$

$+8 \quad +8$

$\frac{2x}{2} = \frac{8}{2}$

$x = 4$

So x cannot be 4

Strategy #1: Set the denominator equal to zero and solve. When you solve the equation, you have just discovered what x CANNOT be. Your domain is everything except that (those) value(s). All Real Numbers except 4.

2. No value is allowed in the domain that results in a negative number under a radical with an even index (ex. A square root; a fourth root; etc.)

Consider $\sqrt{3x-15}$

not negative

$3x - 15 \geq 0$

$+15 \quad +15$

$\frac{3x}{3} \geq \frac{15}{3}$

$x \geq 5$

So x can be any real number greater than or equal to 5.

Strategy #2: Take the radicand (what's under the radical) and set it "greater than or equal to" zero. Solve the inequality. This IS your domain. Remember that there is only a potential problem with the domain when the index is even.

All real numbers ≥ 5

Questions to ask when you're looking for THE DOMAIN

1) Will any value of x result in a zero denominator? If "yes", follow Strategy #1 above.
2) Will any value of x result in a negative number under a radical with an even index? If "yes", follow Strategy #2 above.

If you answer "no" to both questions, your Domain is All Real Numbers.

Webassign problems about domain

1) Find the domain of the expression

$4x^2 - 2x + 7$

So Strategy 1 doesn't apply since its not a fraction.

Strategy 2 doesn't apply since there is no radical.

So the domain is all real numbers.

2) $\frac{x+9}{5x+8}$

its a fraction so lets use strategy 1.

$5x + 8 = 0$

$-8 \quad -8$

$\frac{5x}{5} = \frac{-8}{5}$

$x = \frac{-8}{5}$

So the domain is all real numbers x such that $x \neq \frac{-8}{5}$.

3) $\sqrt{x+17}$

its a radical with an even index so lets try strategy 2.

$x + 17 \geq 0$

$x \geq -17$

So the domain is all real numbers ≥ -17.