

INSTRUCTOR GUIDANCE EXAMPLE: Week One Discussion

Domains of Rational Expressions

Students, you are perfectly welcome to format your math work just as I have done in these examples. However, the written parts of the assignment MUST be done about your own thoughts and in your own words. You are NOT to simply copy this wording into your posts!

Here are my given rational expressions on which to base my work.

$\frac{25x^2 - 4}{67}$	$\frac{5 - 9w}{9w^2 - 4}$
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The **domain** of a rational expression is the **set** of all numbers which are allowed to substitute for the variable in the expression. It is possible that some numbers will not be allowed depending on what the denominator has in it.

In our **Real Number** System division by zero cannot be done. There is no number (or any other object) which can be the answer to division by zero so we must simply call the attempt “undefined.” A denominator cannot be zero because in a rational number or expression the denominator divides the numerator.

In my first expression, the denominator is a constant term, meaning there is no variable present. Since it is impossible for 67 to equal zero, there are no **excluded values** for the **domain**. We can say the **domain** (D) is the set of all **Real Numbers**, written in **set** notation that would look like this:

$$D = \{x \mid x \in \mathfrak{R}\} \text{ or even more simply as } D = \mathfrak{R}.$$

For my second expression, I need to set the denominator equal to zero to find my **excluded values** for w.

$9w^2 - 4 = 0$	I notice this is a difference of squares which I can factor .
$(3w - 2)(3w + 2) = 0$	Set each factor equal to zero.
$3w - 2 = 0$ or $3w + 2 = 0$	Add or subtract 2 from both sides.
$3w = 2$ or $3w = -2$	Divide both sides by 3.
$w = 2/3$ or $w = -2/3$	These are the excluded values for my second expression.

The domain (D) for my second expression is the **set** of all **Reals** excluding $\pm 2/3$. In **set** notation, this can be written as $D = \{w \mid w \in \mathfrak{R}, w \neq \pm 2/3\}$

Now, both of my expressions do not have **excluded values**. In one expression, I have no **excluded values** because there is no variable in the denominator and a non-zero number will never just become zero. In the other expression, there are two **excluded** numbers because both, if inserted in place of the variable, would cause the denominator to become zero and thus the whole expression would become undefined.