Week Three Discussion

Simplifying Radicals

1. Simplify each expression using the rules of exponents and explain the steps you are taking.

No.12

$$Simplify \left(\frac{5^{\frac{1}{3}}}{5^{-\frac{2}{3}}}\right)^{-3}$$

$\left(\frac{5^{\frac{1}{3}}}{5^{-\frac{2}{3}}}\right)^{-3}$ *, use the power rule to multiply inner and outside exponents*

$$\frac{1}{3} * -3 = -1 \; in \; the \; numerator$$

$$-\frac{2}{3} * -3 = 2 \; in \; the \; denominator$$

$$\frac{5^{-1}}{5^{2}} = 5^{-1-2} \; applying \; power \; rule \; of \; division$$

$5^{-1-2} = 5^{-3}$

$= \frac{1}{5^3}$ *eliminate by applying* ***the reciprocal rule****. This rule applies because when a sign of power Is altered, the value is reciprocated*

$$\frac{1}{5^3} = \mathbf{\frac{1}{125}}$$

No.64

$$\left(\frac{144a^8}{9y^{18}}\right)^{\frac{1}{2}}$$

$\left(\frac{144a^8}{9y^{18}}\right)^{\frac{1}{2}}$, *finding the square root of both numerator and denominator by* ***nth root rule***

$$\left(\frac{144a^8}{9y^{18}}\right)^{\frac{1}{2}} = \sqrt{\frac{144a^8}{9y^{18}}} = \frac{\pm 12a^4}{\pm 3y^9}$$

Below are by ***nth root rule***

$$\sqrt{144} = \pm 12$$

$$\sqrt{9} = \pm 3$$

$$\sqrt{a^8} = \pm a^4$$

$$\sqrt{y^{18}} = y^9$$

$$\frac{\pm 12a^8}{\pm 3y^9} = \boldsymbol{\frac{4a^4}{y^9}}$$

2. Next, write each expression in the equivalent radical form and demonstrate how it can be simplified in that form, if possible.

No.12

Expressing in equivalent radical form $\left(\frac{5^{\frac{1}{3}}}{5^{-\frac{2}{3}}}\right)^{-3}$

$$\left(\frac{5^{\frac{1}{3}}}{5^{-\frac{2}{3}}}\right)^{-3} = \left(5^{\frac{1}{3}--\frac{2}{3})}\right)^{-3}, By\ power\ rule\ of\ \ division$$

$$\left(5^{\frac{1}{3}--\frac{2}{3})}\right)^{-3} = 5^{-3}$$

$$5^{-3} = \mathbf{\frac{1}{125}}$$

No.64

$$\left(\frac{144a^8}{9y^{18}}\right)^{\frac{1}{2}}$$

$\left(\frac{144a^8}{9y^{18}}\right)^{\frac{1}{2}}$, *Expressing the numerator and denominator values in power*

$144 = (\pm 12)^2$ *by* ***principal root rule i****n the numerator.*

This rule applies because by principal root rule, the square of both negative and positive of same number yields equal value

$9 = (\pm 3)^2$ *by* ***principal root rule*** *in the denominator*

$$\left(\frac{144a^8}{9y^{18}}\right)^{\frac{1}{2}} = \left(\frac{12^2a^8}{3^2y^{18}}\right)^{\frac{1}{2}}$$

$\left(\frac{12^2a^8}{3^2y^{18}}\right)^{\frac{1}{2}}$, *Multiplying the inner and outside exponents by power rule;*

$(12^2a^8)\text{^}(1/2) = 12a^4$ *in the numerator*

$3^2y^{18} = 3y^9$ *in the denominator*

$$\frac{12a^4}{3y^9} = \frac{4a^4}{y^9} \; by\ simple\ division$$

$$\boldsymbol{\frac{4a^4}{y^9}}$$

3. Which form do you think works better for the simplification process and why?

The equivalent radical form works better for the simplification process because it reduces two base powers to one before multiplying the inner and outside power exponents.

Both quotient rule and product rule do not apply in this choice of example since they are applied when finding derivatives thus they will be applicable under the topic of differentials.