R2 Day 1

1. Answer the following without a calculator (or without looking back at your notes).

$2^2 = 4$ $3^2 = 9$ $4^2 = 16$ $5^2 = 25$ $6^2 = 36$ $13^2 = 169$

$2^3 = 8$ $3^3 = 27$ $4^3 = 64$ $5^3 = 125$ $6^3 = 216$ $14^2 = 196$

$2^4 = 16$ $3^4 = 81$ $4^4 = 256$ $5^4 = 625$ $7^2 = 49$ $15^2 = 225$

$2^5 = 32$ $3^5 = 243$ $7^3 = 343$ $16^2 = 256$

$2^6 = 64$ $17^2 = 289$

(2-13) Simplify using only positive exponents:

2. $(-3)^{-1}$

$= \frac{1}{-3}$

$= -\frac{1}{3}$

3. $(-7)^{-2}$

$= \frac{1}{(-7)^2}$

$= \frac{1}{49}$

4. -7^{-2}

$= -1 \cdot 7^{-2}$

$= -1 \cdot \frac{1}{7^2}$

$= -\frac{1}{49}$

5. $\left(\frac{1}{3}\right)^0$

$= 1$

6. $\left(\frac{1}{10}\right)^{-1}$

$= \frac{1}{\left(\frac{1}{10}\right)} = 1 \cdot \frac{10}{1} = 10$

just do the reciprocal!

$\left(\frac{1}{10}\right)^{-1} = 10$

7. $(a^2b^2)^5$

$= (a^2)^5 \cdot (b^2)^5$

$= a^{10}b^{10}$

8. $\left(2c^4d^{-2}\right)^{-3}$

$= \left(\frac{2c^4}{d^2}\right)^{-3}$

$= \left(\frac{8c^2}{d^6}\right)^{-1}$

$= \frac{d^6}{8c^2}$

9. $\left(5p^{-3}q\right)^2 (3p^8q^4)^{-1}$

$\left(\frac{5q}{p^3}\right)^2 (3p^8q^4)^{-1}$

$\frac{25q^2}{p^6} \cdot \frac{1}{3p^8q^4}$

$= \frac{25q^2}{3p^{14}q^4}$

$= \frac{25}{3p^{14}q^2}$

10. $\left(\frac{m^{-2}n^3}{m^4n^{-1}}\right)^2$

$= \left(\frac{n^3 n^1}{m^4 m^2}\right)^2$

$= \left(\frac{n^4}{m^6}\right)^2$

$= \frac{n^8}{m^{12}}$

11. $\left(\frac{6mn^{-2}}{3m^{-1}n^2}\right)^{-3}$

$= \left(\frac{2m \cdot m^1}{n^2 \cdot n^2}\right)^{-3}$

$= \left(\frac{2m^2}{n^4}\right)^{-3}$

$= \left(\frac{8m^6}{n^{12}}\right)^{-1} = \frac{n^{12}}{8m^6}$

12. $\left(\frac{3m^{-5}n^2}{4m^{-2}n^0}\right)^2 \cdot \left(\frac{mn^4}{9n}\right)^2$

$= \left(\frac{3n^2m^2}{4m^5n^0}\right)^2 \cdot \left(\frac{mn^3}{9}\right)^2$

$= \frac{9 \cdot n^4}{16m^9} \cdot \frac{m^2n^6}{81} = \frac{n^{10}}{144m^7}$

13. $\left(\frac{3x^3y^0}{x^{-2}}\right)^2 \cdot \left(\frac{y^2x^{-4}}{5xy^{-8}}\right)^3$

$(3x^5)^2 \cdot \left(\frac{y^2y^8}{5x^4x}\right)^3$

$= 9x^{10} \cdot \frac{y^{30}}{125x^{15}}$

$= \frac{9y^{30}}{125x^5}$

14. Show two monomials whose quotient is: $6a^2b^3$

14. Find x and y when $\frac{b^x}{b^y} = b^9$ and $\frac{b^x \cdot b^2}{b^{3y}} = b^{13}$. Justify how you find your answer.

$\begin{cases} x - y = 9 \\ x + 2 - 3y = 13 \end{cases}$

$\begin{cases} x - y = 9 \\ x - 3y = 11 \end{cases}$

$\begin{cases} x - y = 9 \\ -x + 3y = -11 \end{cases}$

$2y = -2$

$y = -1$

$x = 8$

15. Compare the values of a^n and a^{-n} for $0 < a < 1$ and as n → ∞.

As $n \to \infty$, $a^n \to 0$. Example: $a = \frac{1}{2}$ $\left(\frac{1}{2}\right)^{100}$ is super close to 0.

As $n \to \infty$, $a^{-n} \to \infty$. Example: $a = \frac{1}{2}$ $\left(\frac{1}{2}\right)^{-100} = 2^{100}$ is very large!