7.3 - Part 1 Completed Notes

7.3a: Nonterminating Decimals (Without Conversions to Fractions)

Fact: The fraction $\frac{a}{b}$ is equivalent to the problem $a \div b$.

Example: Convert $\frac{3}{4}$ to a decimal.

$$\begin{array}{r} 0.75 \\ 4\overline{)3.00} \\ -0 \\ \hline 30 \\ -28 \\ \hline 20 \\ -20 \\ \hline 0 \end{array}$$

$$\frac{3}{2^2} \cdot \frac{5^2}{5^2} = \frac{75}{10^2} = 0.75$$

Example: Try to write $\frac{1}{3}$ as a decimal number using division.

$$\begin{array}{r} 0.333\ldots \\ 3\overline{)1.000} \\ -\ 9 \\ \hline 10 \\ -\ 9 \\ \hline 10 \end{array}$$

$0.\overline{3}$ $\quad 0.3\overline{3}$ or $0.\overline{33}$

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Definition: A repeating decimal is a decimal whose digits repeat every fixed number of digits.

Example: Convert the following fractions to decimals.

(a) $\frac{5}{11}$

$$
\begin{array}{r}
0.4545\ldots \\
11\,\overline{)\,5.0000} \\
-44 \\
\hline
60 \\
-55 \\
\hline
50 \\
-44 \\
\hline
60
\end{array}
$$

$$\boxed{0.\overline{45}}$$

(b) $\frac{2}{9}$

$$
\begin{array}{r}
0.22 \\
9\,\overline{)\,2.00} \\
-18 \\
\hline
20 \\
-18 \\
\hline
2
\end{array}
$$

$$\boxed{0.\overline{2}}$$

(c) $\frac{1}{7}$

$$
\begin{array}{r}
0.\overline{142857} \\
7\,\overline{)\,1.000000} \\
-7 \\
\hline
30 \\
-28 \\
\hline
20 \\
-14 \\
\hline
60 \\
-56 \\
\hline
40 \\
-35 \\
\hline
50 \\
-49 \\
\hline
1
\end{array}
$$

7.3 - Part 1 Completed Notes

Ordering Decimals:

To determine which of two decimals is larger, we consider their fraction representation.

Example: Show that 1.051 > 1.0495.

$$1.051 = 1 + \frac{0}{10} + \underbrace{\frac{5}{100} + \frac{1}{1000} + \frac{0}{10000}}_{\frac{510}{10000}}$$

$$1.0495 = 1 + \frac{0}{10} + \underbrace{\frac{4}{100} + \frac{9}{1000} + \frac{5}{10000}}_{\frac{495}{10000}}$$

In summary, to order decimals, we consider the following:

1. If the whole number is larger, then the decimal is larger.
2. If the whole number is smaller, then the decimal is smaller.
3. If the whole numbers are equal, then we consider each decimal place (adding zeroes if necessary) until we reach the first decimal place where the digits are different. Whichever number has the larger digit is the larger number.
4. If the whole numbers and all the digits are the same, the decimals are equal.

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Example: Fill in the blanks with <, >, or =.

$1.234 \underline{\ >\ } 0.345$ whole number larger

$5.62 \underline{\ <\ } 5.621$

$5.620 < 5.621$

$2.207 \underline{\ <\ } 2.211$

$1.\overline{45} \underline{\ >\ } 1.45\overline{4}$

$1.454545\ldots \underline{\quad} 1.454444\ldots$

$1.\overline{36} \underline{\ >\ } 1.363$

$1.363636 \underline{\quad} 1.3630$