Mat 011 Agenda    Day 2: 9/6/02

- Attendance
- Review PowerPoint Lecture 1, S1-S2

Definition of Subtraction
Multiplication Signed Numbers
Zero as a Factor
Quotient
Zero as a divisor
Order of Operation

- PowerPoint Lecture 2, S3-S4

Homework: Topics 3 and 4 pages S7-S11
Mat 011 Web page:
http://www.mc3.edu/crsprog/career/MATHSCI/mat011/mat011.htm

BlackBoard:  http://blackboard.mc3.edu
Your username is:  << first letter first name – full last name – last 4 digits of Datatel ID>>
Password is:  <<Datatel ID>>
For Example:
Student Name:  John Smith  Datatel ID:  1234567
ID:  jsmith4567
Password:  1234567
Questions?
Perform the operation:

<table>
<thead>
<tr>
<th>Operation</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>$-7 + 5$</td>
<td>$-2$</td>
</tr>
<tr>
<td>$6 - 10$</td>
<td>$-4$</td>
</tr>
<tr>
<td>$2 - 11$</td>
<td>$-9$</td>
</tr>
<tr>
<td>$-8 - 15$</td>
<td>$-23$</td>
</tr>
<tr>
<td>$-6 + 10$</td>
<td>$4$</td>
</tr>
</tbody>
</table>

\[
\frac{3}{4} - \frac{2.6}{2} = \frac{-7}{12}
\]
3. \[ \frac{1}{3} + \frac{3}{12} + \frac{4}{12} = \frac{7}{12} \]
\[ 6 - 8 = -2 \]
\[ (+6) - (+8) \]
\[ (+6) + (-8) = -2 \]

\[ 6 - (-8) \]
\[ 6 + (+8) = 14 \]
Subtraction Key

-key, binary key,

7th row, 5th column
Opposite Key

(-) key, unary operation

9th row, 4th column
Use of the calculator to evaluate \(-8.6 + 11.4\)

To add signed numbers use the opposite \((-)\) key, 9th row, 4th column.

\(-8.6 + 11.4\) is keyed in as \((-), 8.6, +, 11.4, \text{ ENTER}\).
Use the calculator to evaluate: $-16.85 - 28.42$

To add signed numbers use the opposite key ($-$) and binary subtraction key $-$.

$-16.85 - 28.42$ is keyed in as $(-), 16.85, -, 28.42, \text{ENTER}$
Mathematical Statements into Symbols

1. I will lose $5 a day for the next three days. How much money will I lose?

\[
\begin{align*}
(-5) \times (3) &= -15 \\
(5) \times (-3) &= -15
\end{align*}
\]
2. I lost $6 a day for the previous four days. How much more money did I have four days ago?

\[
(-6)(-4) = 24
\]

\[
\begin{align*}
\text{Like Signs} & : \\
(+) (+) &= + \\
(-) (-) &= +
\end{align*}
\]

\[
\begin{align*}
\text{Unlike} & : \\
(+)(-) &= - \\
(-)(+) &= -
\end{align*}
\]
Multiplication of Two Signed Numbers

- Like Signs:
  - 
  \((+)(+) = +\)
  - 
  \((-)(-) = +\)

- Unlike Signs:
  - 
  \((+)(-) = -\)
  - 
  \((-)(+) = -\)
Multiplication of Two Signed Numbers

- Like Signs: Positive
  - $(+)(+) = +$
  - $(-)(-) = +$

- Unlike Signs: Negative
  - $(+)(-) = -$ 
  - $(-)(+) = -$
Perform the operation:

<table>
<thead>
<tr>
<th>Expression</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>((-6)(3))</td>
<td>(-18)</td>
</tr>
<tr>
<td>((-7)(-2))</td>
<td>(14)</td>
</tr>
<tr>
<td>((8)(-4))</td>
<td>(-32)</td>
</tr>
<tr>
<td>(18)</td>
<td>(-6)</td>
</tr>
<tr>
<td>(-3)</td>
<td></td>
</tr>
<tr>
<td>(-21)</td>
<td>(-3)</td>
</tr>
<tr>
<td>(7)</td>
<td></td>
</tr>
<tr>
<td>(-48)</td>
<td>(8)</td>
</tr>
<tr>
<td>(-6)</td>
<td></td>
</tr>
</tbody>
</table>
Zero As a Factor

Zero multiplied by any number is still zero.

\[ 0 \times 6 = 0 \quad \text{or} \quad 6 \times 0 = 0 \]
\( \frac{\varphi}{2} = 3 \quad 2 \cdot 3 = 6 \)
\[
\begin{align*}
\frac{0}{6} &= 0 & 6 \cdot 0 &= 0 & \checkmark \\
\frac{6}{0} &= \text{undefined} & 0 \cdot 0 &= 6 \\
\frac{0}{0} &= -10 & 0 \cdot 0 &= 0 \\
0 \div 0 &= \text{indeterminate} & 0 \div 10 &= 0 \\
0 \div -10 &= 0
\end{align*}
\]
Division is checked by Multiplication

How do we check that 6 divided by 2 is 3?
Zero divided by any nonzero number is zero.
Zero divided by any nonzero number is zero.
Zero As a Divisor

Zero divided by any nonzero number is zero.

Zero divided by zero is indeterminate.

A number divided by zero is undefined.
undefined

indeterminate
Zero Review

\[
\frac{3}{0} = \text{Undefined}
\]

\[
\frac{0}{3} = 0
\]

\[
\frac{0}{0} = \text{Indeterminate}
\]
Perform the operation:

<table>
<thead>
<tr>
<th>0</th>
<th>0</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>undefined</td>
</tr>
<tr>
<td>8</td>
<td>indeterminate</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>
Use of the calculator to evaluate \((-6.42)(-7.81)\)

To multiply signed numbers use the opposite \((-)\) key, and multiplication \(x\) key

\((-6.42)(-7.81)\)

is keyed in as \((-), 6.42, x, (-), 7.81, ENTE
Use of the calculator to evaluate $(-8.42)/(3.15)$

To divide signed numbers use the opposite $(-)$ key, and division $\div$ key

$(-8.42)/(3.15)$ is keyed in as $(-), 8.42, \div, 3.15, \text{ENTER}$
Use of the calculator to evaluate \((-6.42)(-7.81)\)

To multiply signed numbers use the opposite \((-)\) key, and multiplication \(x\) key.

\((-6.42)(-7.81)\)

is keyed in as \((-), 6.42, x, (-), 7.81,\) ENTER
Use of the calculator to evaluate \((- 8.42)/(3.15)\)

To divide signed numbers use the opposite \((-)\) key, and division \(\div\) key

\((- 8.42)/(3.15)\)

is keyed in as \((-), 8.42, \div, 3.15, \text{ ENTER}\)
Use the calculator to evaluate \((-10.81)/0\)

To divide signed numbers use the opposite \((-\) key, and division \(\div\) key

\((-10.81)/(0)\) is keyed in as \((-\), 10.81, \(\div\), 0, ENTER\)
Order of Operations

Please
Excuse
My Dear
Aunt Sally

Parentheses
Exponents
Multiply, Divide
Add, Subtract
left to right
left to right
Order of Operation

\[ 7(8 - 10) = \]

\[ 7(-2) = -14 \]

\[ \frac{3(-5) - 2(-8)}{2} = \frac{-15 + 16}{2} = \frac{1}{2} \]
Order of Operation

\[
\frac{6(-3) + (5)(-2)}{3 - 10}
\]

\[
\frac{-18 - 10}{-7} = \frac{-28}{-7} = 4
\]