MTH 23.5 LECTURE NOTES (Ojakian)

Topic 5: Order of Operations, Radicals

OUTLINE

References (**Algebra Book**: p.35-39; **Statistics Book**: None)

1. Radicals
2. Absolute Value
3. Order of Operations

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1. Some background mathematics: Radicals

   (a) Recall square roots

   PROBLEM 1. *Calculate the following:* $\sqrt{16}, \sqrt{100}$

   PROBLEM 2. *Which of the following "make sense":* $\sqrt{16}, \sqrt{-16}, \sqrt{0}$

   (b) Inverses

   PROBLEM 3.

   i. Pick your favorite number: square it, then take its square root. What happened?

   ii. Now try reversing the order in the last two parts, taking the root first, then the power. What happened?

   iii. Express these mathematical points using mathematical expressions.

2. Order of operations

(a) The order (**PE(MD)(AS)**):

i. Inside parentheses first (*and absolute value*)
ii. Exponents
iii. Products and division
iv. Addition and subtraction
v. Read left to right

(b) Note: Often put in extra parentheses for emphasis.

PROBLEM 4. *Compute the following*

i. $7 + 8 \cdot (-1)$
ii. $(7 + 8) \cdot (-1)$
iii. $7 \cdot (-3) + 6/2$
iv. *Consider the last expression.*
- *Insert parentheses into the last expression so that it is evaluated from left to right. Then evaluate it.*
- *Insert parentheses into the last expression so that it is evaluated from right to left. Then evaluate it.*

v. $|-7|$
vi. $|7|$
vii. $|-9| - |3 - 8|$
viii. $3 + (-5)2^3$
ix. $(-2)^4$ *versus* -2^4
x. $(-2)^3$ *versus* -2^3