Name: Rosendo Felix Math 1010 Guided Notes

Module: 2 H.W. Number: 2.2 Textbook Section: 8.3

A. Take notes while reading the textbook or watching the lecture videos. Write out any definitions, formulas, properties, or procedure steps.

Distance definition of absolute value: distance of a number from 0

Note that $|x - c|$ gives the distance from c and not 0 as in the definition above

Absolute value equations or inequalities must be separated into 2 cases, one positive and one negative.

Equations: where the variable is within an absolute value operator.

Inequalities: isolate the absolute value on left then solve

Remember when to swap the direction of the inequality

x by -1 or ÷ by -1

$|ax + b| = k$ and $|ax + b| > k$ are "or"s

$|ax + b| < k$ is an "and" **but check answer in intervals to be sure**

$|ax + b| = |cx + d|$ can be solved by $|ax+3| = |cx+d|$ or $|ax+3| = -(cx+d)$ but **check the answers**

For inequalities of the form $|ax + b| + c > k$, ax+5 will never be below zero

Special cases can be found by **checking the answers**

B. Write out each learning OBJECTIVE word for word. Write one example demonstrating that objective.

OBJECTIVE 1: Use the distance definition of absolute value

Summarize Figures 21, 22, 23 on page 576

21- $(-\infty, -4) \cup (4, \infty)$

22- $(-4, 4)$

23- $(-4, 4)$

OBJECTIVE 2: Solve equations of the form $|ax + b| = k$ for $k > 0$

EXAMPLE 1, page 577

$|2x+1| = 7$

$2x+1 = 7$ or $2x+1 = -7$

$2x = 6$ $2x = -8$

$x = 3$ or $x = -4$

OBJECTIVE 3: Solve absolute value inequalities

EXAMPLE 2, page 578

$|2x+1| > 7$

$2x+1 > 7$ or $2x+1 < -7$

$2x > 6$ $\quad 2x < -8$

$x > 3$ or $x < -4$

EXAMPLE 3, page 579

$|2x+1| < 7$

$-7 < 2x+1 < 7$

$-8 < 2x < 6$

$-4 < x < 3$

$(-4, 3)$

OBJECTIVE 4: Solve absolute value equations that involve rewriting

EXAMPLE 6, page 580

$|x+3|+5 \geq 12$

$x+3 \geq 7$ or $x+3 \leq -7$

$x \geq 4$ or $x \leq -10$

solution set $= (-\infty, -10] \cup [4, \infty)$

$|x+3|+5 \leq 12$

$|x+3| \leq 7$

$-7 \leq x+3 \leq 7$

$-10 \leq x \leq 4$

solution set $= [-10, 4]$

OBJECTIVE 5: Solve double absolute value equations

EXAMPLE 7, page 581

$|x+6| = |2x-3|$

$x+6 = 2x-3$ or $x+6 = -(2x-3)$

$x+9 = 2x$ $\quad x+6 = -2x+3$

$9 = x$ $\quad 3x = -3$

$x = 9$ $\quad x = -1$

check

$|9+6| = |2 \cdot 9 - 3|$ $\quad -1+6 = 2 \cdot -1 - 3$

$15 = 15$ $\quad 5 = 5$

OBJECTIVE 6: Solve special case absolute values

EXAMPLE 8a and b, page 581

$|5x-3| = -4$

$\emptyset$

$7x-3=0$

$7x=3$

$x=\frac{3}{7}$

answer of absolute value cannot be negative

EXAMPLE 9a, b & c, page 582

a. $|x| \geq -4$

$\mathbb{R}$

b. $|x+6|-3 < -5$

$|x+6| < -2$

$\emptyset$

c. $|x-7|+4 \leq 4$

$|x-7| \leq 0$

$x \geq 7$