HOMEWORK 2: SOLUTIONS - MATH 111
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Problem 1 *Find the point of intersection of* $y = 5x - 2$ *and* $y = -5x + 18$.

Solution:

Since at the point of intersection the two lines will have equal y-values, we get $5x - 2 = -5x + 18$, whence $10x = 20$, and, therefore, $x = 2$. Plugging back into either $y = 5x - 2$ or $y = -5x + 18$, we get $y = 8$. Thus the point of intersection is $(2, 8)$. ■

Problem 2 *The sales of a company are approximated by a linear equation. If the sales were $ 90,000 in 1990 and $ 110,000 in 1993, find the amount of sales in 1995.*

Solution:

The line that approximates the sales passes through the points $(1990, 90000)$ and $(1993, 110000)$. Thus its slope m is given by

$$m = \frac{110000 - 90000}{1993 - 1990} = \frac{20000}{3}.$$

Its equation is therefore given by the point-slope form

$$y - 90000 = \frac{20000}{3}(x - 1990).$$

Now, plug in 1995 for the year x to obtain

$$y = \frac{20000}{3}(1995 - 1990) + 90000 = \frac{20000}{3}5 + 90000.$$

■

Problem 3 *Find the solutions of* $(x - 5)(8x - 7) = 0$.

Solution:

$(x - 5)(8x - 7) = 0$ implies $x - 5 = 0$ or $8x - 7 = 0$ and, thus $x = 5$ or $x = \frac{7}{8}$. ■

Problem 4 *Find the solutions of* $x^2 = 19$.

Solution:

We have, by the square-root property $x = -\sqrt{19}$ or $x = \sqrt{19}$. ■

Problem 5 *Find the solutions of* $x^2 - 6x - 27 = 0$.

Solution:

We have $x^2 - 6x - 27 = 0$ implies $(x - 9)(x + 3) = 0$, whence $x - 9 = 0$ or $x + 3 = 0$, and, therefore $x = 9$ or $x = -3$. ■

Problem 6 *Solve the linear inequality* $7x + 4 \leq 25$.

Solution:

We have $7x + 4 \leq 25$ implies $7x \leq 21$, whence $x \leq 3$. ■

Problem 7 *Solve the inequality* $x + 5(x - 3) > 11(2 + 5x) - 7x$.

Solution:

$x+5(x-3) > 11(2+5x)-7x$ gives $x+5x-15 > 22+55x-7x$, whence $6x-15 > 22+48x$, i.e., $-37 > 42x$, and, therefore, $x < -\frac{37}{42}$. ■

Problem 8 *Solve the absolute value inequality* $|x - \frac{4}{7}| + 5 \leq 7$.

Solution:

$|x - \frac{4}{7}| + 5 \leq 7$ gives $|x - \frac{4}{7}| \leq 2$, whence

$$-2 \leq x - \frac{4}{7} \leq 2 \Rightarrow -2 + \frac{4}{7} \leq x \leq 2 + \frac{4}{7},$$

and, therefore $-\frac{10}{7} \leq x \leq \frac{18}{7}$. ■