HOMEWORK 2: SOLUTIONS - MATH 111
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Problem 1 *Find the point of intersection of* $y = 3x + 2$ *and* $y = -5x + 18$.

Solution:

Since at the point of intersection the two lines will have equal y-values, we get $3x + 2 = -5x + 18$, whence $8x = 16$, and, therefore, $x = 2$. Plugging back into either $y = 3x + 2$ 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 $ 100,000 in 1990 and $ 400,000 in 1993, find the amount of sales in 1995.*

Solution:

The line that approximates the sales passes through the points $(1990, 100000)$ and $(1993, 400000)$. Thus its slope m is given by

$$m = \frac{400000 - 100000}{1993 - 1990} = \frac{300000}{3} = 100000.$$

Its equation is therefore given by the point-slope form

$$y - 100000 = 100000(x - 1990).$$

Now, plug in 1995 for the year x to obtain

$$y = 100000(1995 - 1990) + 100000 = 500000 + 100000 = 600000.$$

■

Problem 3 *Find the solutions of* $(x + 5)(2x - 7) = 0$.

Solution:

$(x + 5)(2x - 7) = 0$ implies $x + 5 = 0$ or $2x - 7 = 0$ and, thus $x = -5$ or $x = \frac{7}{2}$. ■

Problem 4 *Find the solutions of* $x^2 = 16$.

Solution:

We have, by the square-root property $x = -\sqrt{16}$ or $x = \sqrt{16}$. Therefore $x = -4$ or $x = 4$. ■

Problem 5 *Find the solutions of* $x^2 - 6x - 16 = 0$.

Solution:

We have $x^2 - 6x - 16 = 0$ implies $(x - 8)(x + 2) = 0$, whence $x - 8 = 0$ or $x + 2 = 0$, and, therefore $x = 8$ or $x = -2$. ■

Problem 6 *Solve the linear inequality* $5x - 3 \leq 12$.

Solution:
We have $5x - 3 \leq 12$ implies $5x \leq 15$, whence $x \leq 3$. ∎

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

Solution:
$x+3(x-2) > 7(2+3x)-11x$ gives $x+3x-6 > 14+21x-11x$, whence $4x-6 > 14+10x$, i.e., $-20 > 6x$, and, therefore, $-\frac{20}{6} > x$, i.e., $x < -\frac{10}{3}$. ∎

Problem 8 *Solve the absolute value inequality* $|x - \frac{2}{5}| - 1 \leq 2$.

Solution:
$|x - \frac{2}{5}| - 1 \leq 2$ gives $|x - \frac{2}{5}| \leq 3$, whence

$$-3 \leq x - \frac{2}{5} \leq 3 \Rightarrow -3 + \frac{2}{5} \leq x \leq 3 + \frac{2}{5},$$

and, therefore $-\frac{13}{5} \leq x \leq \frac{17}{5}$. ∎