HOMEWORK 2: SOLUTIONS - MATH 111
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Problem 1 *The point of intersection of* $y = x + 1$ *and* $y = -\frac{1}{3}x + 2$ *is*

$$(a) \quad (3,4) \quad (b) \quad (\frac{3}{4}, \frac{4}{7}) \quad (c) \quad (\frac{3}{4}, \frac{7}{4}) \quad (d) \quad (\frac{7}{4}, \frac{3}{4})$$

Solution:

Since at the point of intersection the two lines will have equal y-values, we get $x + 1 = -\frac{1}{3}x + 2$, whence $\frac{4}{3}x = 1$, and, therefore, $x = \frac{3}{4}$. Plugging back into either $y = x + 1$ or $y = -\frac{1}{3}x + 2$, we get $y = \frac{7}{4}$. Thus the point of intersection is $(\frac{3}{4}, \frac{7}{4})$, and (c) the correct answer. ■

Problem 2 *The sales of a company are approximated by a linear equation. If the sales were $ 200,000 in 1985 and $ 600,000 in 1988, then the amount of sales in 1991 is*

$$(a) \quad \$400,000 \quad (b) \quad \$1,000,000 \quad (c) \quad \$800,000 \quad (d) \quad \$1,200,000$$

Solution:

The line that approximates the sales passes through the points $(1985, 200000)$ and $(1988, 600000)$. Thus its slope m is given by

$$m = \frac{600,000 - 200,000}{1988 - 1985} = \frac{400,000}{3}.$$

Its equation is therefore given by the point-slope form

$$y - 200,000 = \frac{400,000}{3}(x - 1985).$$

Now, plug in 1991 for the year x to obtain

$$y = \frac{400,000}{3}(1991 - 1985) + 200,000 = 1,000,000.$$

Thus, the correct answer is (b). ■

Problem 3 *The solutions of* $(x - 7)(3x + 5) = 0$ *are*

$$(a) \quad 7,3 \quad (b) \quad 5,7 \quad (c) \quad -7, \frac{5}{3} \quad (d) \quad 7, -\frac{5}{3}$$

Solution:

$(x - 7)(3x + 5) = 0$ implies $x - 7 = 0$ or $3x + 5 = 0$ and, thus $x = 7$ or $x = -\frac{5}{3}$. Thus (d) is the right answer. ■

Problem 4 *The solutions of* $x^2 = 9$ *are*

$$(a) \quad 1, 3 \quad (b) \quad \frac{1}{3}, -\frac{1}{3} \quad (c) \quad 3, -3 \quad (d) \quad 8, 1$$

Solution:
$x^2 = 9$ implies $x = -\sqrt{9}$ or $x = \sqrt{9}$, i.e., $x = -3$ or $x = 3$. Thus, (c) is the right answer. ■

Problem 5 *The solutions of* $x^2 - 3x - 10 = 0$ *are*

$$(a) \quad -2, 5 \quad (b) \quad 2, -5 \quad (c) \quad 2, 5 \quad (d) \quad -2, -5$$

Solution:
We have $x^2 - 3x - 10 = 0$ implies $(x - 5)(x + 2) = 0$, whence $x - 5 = 0$ or $x + 2 = 0$, and, therefore $x = 5$ or $x = -2$. Hence (a) is the correct answer. ■

Problem 6 *The solution of* $4x + 3 \leq 12$ *is*

$$(a) \quad x \leq \frac{9}{4} \quad (b) \quad x \leq 12 \quad (c) \quad x \geq 4 \quad (d) \quad x \geq -\frac{9}{4}$$

Solution:
We have $4x + 3 \leq 12$ implies $4x \leq 9$, whence $x \leq \frac{9}{4}$. Thus, (a) is the correct answer. ■

Problem 7 *The solution of* $x + 4(x + 1) > 5(2 - x) + x$ *is*

$$(a) \quad x \leq \frac{1}{3} \quad (b) \quad x > \frac{2}{3} \quad (c) \quad x < \frac{3}{2} \quad (d) \quad x \geq \frac{1}{3}$$

Solution:
$x + 4(x + 1) > 5(2 - x) + x$ gives $x + 4x + 4 > 10 - 5x + x$, whence $5x + 4 > 10 - 4x$, i.e., $9x > 6$, and, therefore, $x > \frac{2}{3}$. Thus, (b) is the right answer. ■

Problem 8 *The solution of* $|x + \frac{2}{5}| + 1 < 3$ *is*

$$(a) \quad -\frac{12}{5} < x \quad (b) \quad \frac{12}{5} < x < \frac{18}{5} \quad (c) \quad x < \frac{8}{5} \quad (d) \quad -\frac{12}{5} < x < \frac{8}{5}$$

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

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

and, therefore $-\frac{12}{5} < x < \frac{8}{5}$. Thus, (d) is the right answer. ■