Math 109 P Section 2 Quiz 6 *A*

TA	:	Racovitan Michael
Office	:	DU 370
E-mail	:	racovita@math.niu.edu
Web page	:	www.math.niu.edu/∼racovita/Math109P/Math109P2.html

Solutions

(1) Use synthetic division to perform the division. $(2x^3 - 9x^2 + 10x - 3) \div (x - 3)$

Solutions.

The coefficients of $2x^3 - 9x^2 + 10x - 3$ are 2 for x^3, -9 for x^2, 10 for x, -3 for the free term. We divide by $x - 3$, so in the synthetic division, we use 3. We have the following table:

	x^3		x^2		x		$free$
3 |	2		-9		10		-3
		↗	6	↗	-9	↗	3
	2		-3		1		$\boxed{0}$

Therefore, the quotient has the coefficients 2, -3, and 1, and it starts with the power x^2 (one degree less): $2x^2 - 3x + 1$. The last number, 0, is the remainder. ■

(2) Is $x + 1$ a factor of $P(x) = x^3 + 2x^2 - 2x - 3$? Use **ONLY** the **Factor Theorem** (beware that this is not the factorization we learned in previous chapters).

Solutions.

The **Factor Theorem** states that $x - r$ is a factor of the polynomial $P(x)$ **if and only if** $P(r) = 0$.

$r = -1$ in our case, because $x + 1 = x - (-1)$. Then,

$$P(-1) = (-1)^3 + 2 \cdot (-1)^2 - 2 \cdot (-1) - 3 = -1 + 2 + 2 - 3 = 0 \quad .$$

Then, according to the Factor Theorem, $x + 1$ is a factor of $P(x) = x^3 + 2x^2 - 2x - 3$, because $P(-1) = 0$. ■

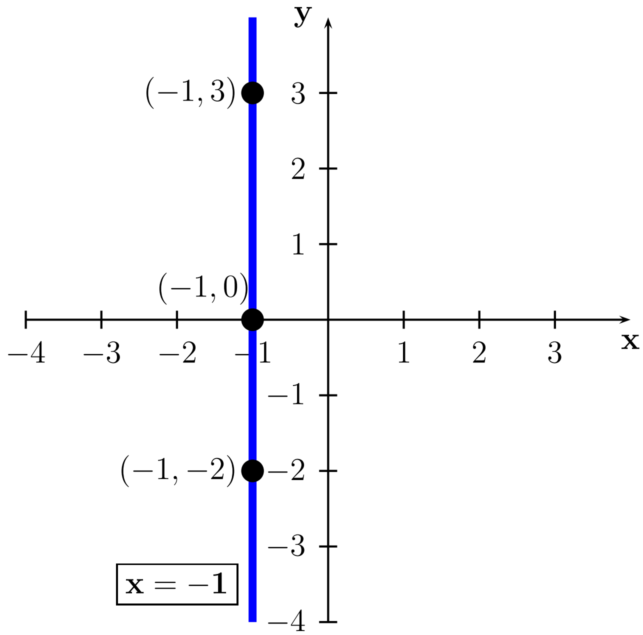
(3) Draw the line $x = -1$.

Solutions.

The line $x = -1$ is a vertical line (all points with the x-coordinate equal to -1, i.e. the y-coordinate can be everything):

x	y
-1	-2
-1	0
-1	3

So, we graph the vertical line that passes through the points $(-1,-2)$, $(-1,0)$, and $(-1,3)$. Here is the graph:



(4) What is the slope of the line passing through the points $(0,-8)$ and $(-5,0)$.

<u>*Solutions*</u>.

The definition of the slope of the line passing through the points (x_1, y_1) and (x_2, y_2) is:

$$m = \frac{y_2 - y_1}{x_2 - x_1} \quad .$$

Let choose $(x_1, y_1) = (0,-8)$ and $(x_2, y_2) = (-5,0)$. Then, the slope of our line is:

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{0-(-8)}{-5-0} = \frac{0+8}{-5} = -\frac{8}{5} \quad . \quad \blacksquare$$