Math 109 P Section 2 — Quiz 6 B

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. $(3x^3 - 10x^2 + 5x - 6) \div (x - 3)$

Solutions.

The coefficients of $3x^3 - 10x^2 + 5x - 6$ are 3 for x^3, -10 for x^2, 5 for x, -6 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 |	3		-10		5		-6
		↗	9	↗	-3	↗	6
	3		-1		2		$\boxed{0}$

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

(2) Is $x + 2$ a factor of $P(x) = x^3 + 3x^2 - x - 6$? 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** $P(r) = 0$.

$r = -2$ in our case, because $x + 2 = x - (-2)$. Then,

$$P(-2) = (-2)^3 + 3 \cdot (-2)^2 - (-2) - 6 = -8 + 12 + 2 - 6 = 0 \quad .$$

Then, according to the Factor Theorem, $x + 2$ is a factor of $P(x) = x^3 + 3x^2 - x - 6$, because $P(-2) = 0$. ■

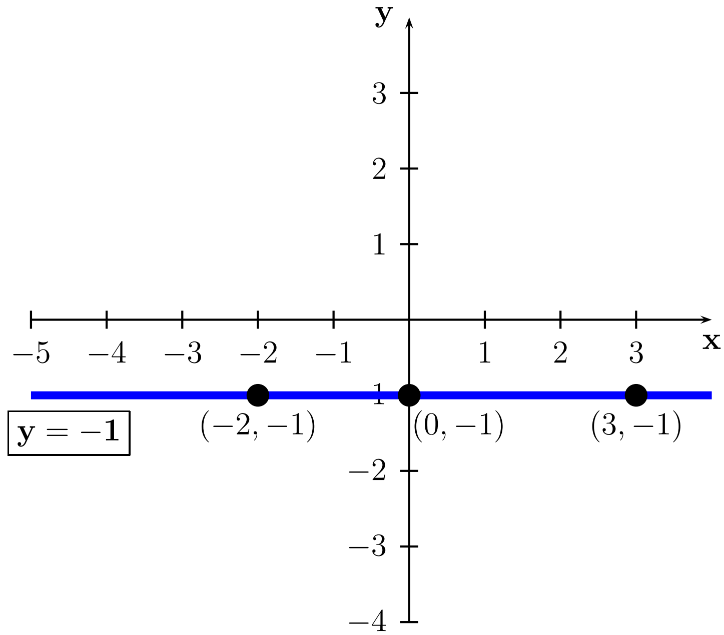
(3) Draw the line $y = -1$.

Solutions.

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

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

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



(4) What is the slope of the line passing through the points $(2,-8)$ and $(-1,0)$.

<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 $(x_1, y_1) = (2,-8)$ and $(x_2, y_2) = (-1,0)$. Then, the slope of our line is:

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{0-(-8)}{-1-2} = \frac{0+8}{-3} = -\frac{8}{3} \quad . \quad \blacksquare$$