MATH 30 - Precalculus, Sec. 2495

Second test. Time allowed: two hours. Professor Luis Fernández

NAME: _____

[8] **1.** Suppose that $f(x)$ is a polynomial and that $f(-3) = 0$. Write down a **factor** of $f(x)$.

[8] **2.** What is the remainder when the polynomial $p(x) = x^{50} + 4x - 1$ is divided by $(x + 1)$?

[8] **3.** Find a polynomial of degree 4 with zeros at 3, 1 and -2.

[8] **4.** Find a polynomial $p(x)$ with zeros at 1, -2 and -1, and such that $p(2) = 6$.

[12] **5.** Factor the polynomial $2x^3 - 5x^2 + 1$.

[10] **6.** **List** all the possible rational roots of the polynomial $9x^7 + 2x^2 - 5x + 10$. NOTE: You are only asked to list them, NOT to factor the polynomial.

[18] **7.** Divide the following polynomials using long division. Write the answer as $D = d \cdot q + r$ or as $\frac{D}{d} = q + \frac{r}{d}$ (where D is the dividend, d is the divisor, q is the quotient and r is the remainder).

a) $\dfrac{x^4 - 3x^3 - 2x^2 + 5x - 3}{x^2 - 2x - 1}$

b) $\dfrac{x^5 + x^2 + 3}{x^4 - 2}$

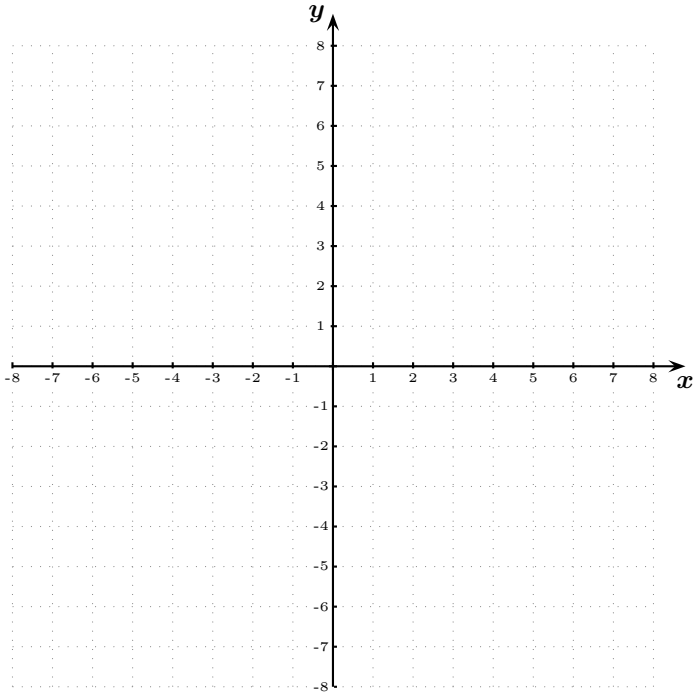
[8] **8.** For the function $f(x) = (x-1)^2 + 2$,

a) Find the vertex and the x- and y-intercepts.

b) Write down the equation of the axis of symmetry.

c) Sketch the graph on the coordinate axes provided.

d) Is the function one-to-one? If not, find an interval where the function is one-to-one.



[12] **9.** Solve the equation $x^5 - 10x^4 + 22x^3 - 4x^2 - 23x + 14 = 0$

[10] **10.** For the rational function $f(x) = \dfrac{x^2 - 3x + 2}{x^2 - 5x - 14}$ find

a) Its Vertical Asymptotes, if any.

b) Its Horizontal Asymptotes.

c) Its x-intercepts with multiplicity, if any.

d) Its y-intercept, if any.

[10] **11.** Sketch the graph of a rational function g that has the following properties:

a) It is neither even nor odd.

b) It has a Vertical Asymptote at $x = 3$.

c) As $x \to \pm\infty$, $g(x) \approx \dfrac{3x^3}{x^3} = 3$.

d) Its only x-intercepts are at $x = -3$, $x = 2$, and $x = 4$, all with multiplicity 1.

e) Its y-intercept is at $y = -2$.