MATH 30 - Precalculus, Version A

First Midterm. Time allowed: 1 hour, 25 minutes.   Professor Luis Fernández

NAME: _____

- **Show your work** in order to get credit. Scientific calculators allowed. Graphing calculators not allowed.
- The midterm has 8 questions, and 104 points, including 4 extra credit points.
- Write your answers in the space provided.

[6] **1.**   Carefully write down the statement of the Remainder Theorem:

[6] **2.**   Suppose that we divide the polynomial $p(x) = x^{100} + 5x^{50} - 6x^{23} + 5$ by $(x + 1)$. What remainder do we get?

[10] **3.**   Divide using long division and write the answer as $D = d \cdot q + r$, where D is the dividend, d is the divisor, q is the quotient and r is the remainder.

$$\frac{6x^3 - 8x^2 - 24x - 11}{2x + 2}$$

[10] **4.** **List** all the possible rational roots of the polynomial $3x^6 - 3x^2 - 15x + 4$.

NOTE: You are only asked to list them, NOT to factor the polynomial.

[12] **5.** Find the equation of the line perpendicular to the line $y = \dfrac{2x}{3} + 4$ and passing through the point $(1, 2)$.
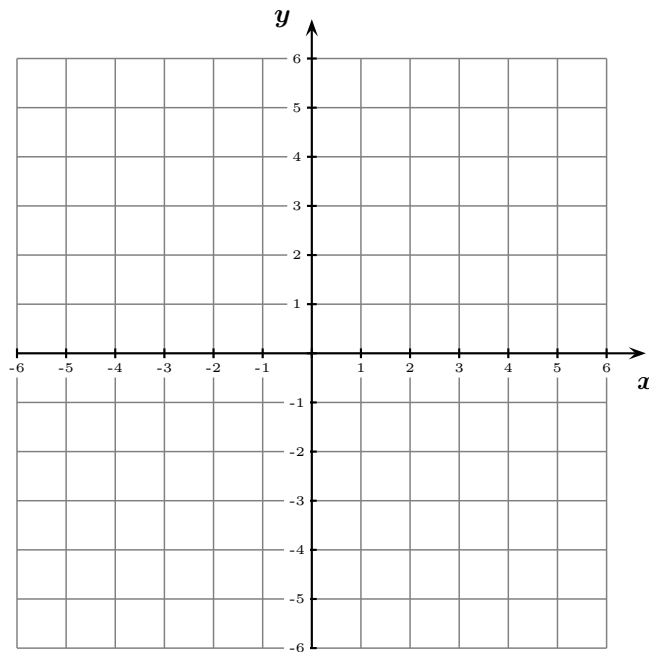
[20] **6.** For the quadratic function $f(x) = -2(x-2)^2 + 4$,

   a) Find the vertex.

   b) Find the x-intercepts, if any.

   c) Find the y-intercepts.

   d) Determine whether the parabola opens up or down. Sketch the graph on the coordinate axes provided.

[20] **7.** Find all the solutions of the equation $x^4 - 9x^3 + 17x^2 - 3x - 6 = 0$.

[NOTE: two of the solutions are rational, so they can be found using synthetic division. The other two are irrational; to find them you need to use the quadratic formula or complete the square.]
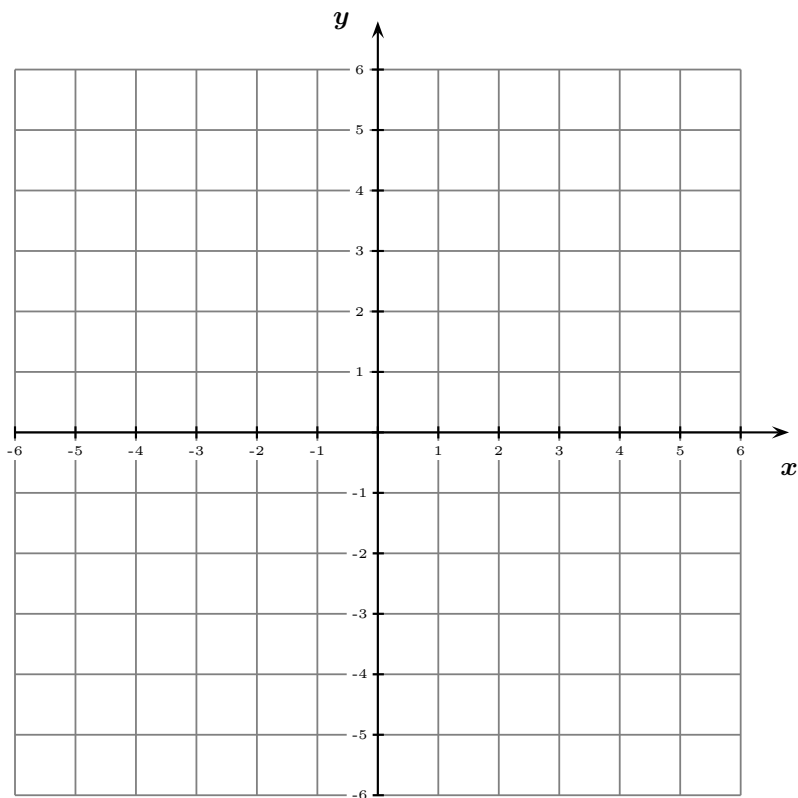
[20] **8.** The polynomial $f(x) = x^3 - 3x + 2$ can be factored as $f(x) = (x-1)^2(x+2)$.

a) Find the end behavior of f.

b) Find the x-intercepts of f and their multiplicity, and the local behavior at the intercepts.

c) Find the y-intercept of f.

d) Sketch the graph of f in the axes provided.

5

MATH 30 - Precalculus, Version B

First Midterm. Time allowed: 1 hour, 25 minutes.   Professor Luis Fernández

NAME: _____

- **Show your work** in order to get credit. Scientific calculators allowed. Graphing calculators not allowed.
- The midterm has 8 questions, and 104 points, including 4 extra credit points.
- Write your answers in the space provided.

[6] **1.**   Carefully write down the statement of the Remainder Theorem:

[6] **2.**   Suppose that we divide the polynomial $p(x) = x^{101} - 7x^{50} - 3x^9 - 8$ by $(x + 1)$. What remainder do we get?

[10] **3.**   Divide using long division and write the answer as $D = d \cdot q + r$, where D is the dividend, d is the divisor, q is the quotient and r is the remainder.

$$\frac{6x^3 + 11x^2 - 2x - 12}{3x + 4}$$

[10] **4.** **List** all the possible rational roots of the polynomial $5x^6 - 14x^4 + 6x^2 - 9$.

NOTE: You are only asked to list them, NOT to factor the polynomial.

[12] **5.** Find the equation of the line perpendicular to the line $y = \dfrac{2x}{3} + 4$ and passing through the point $(1, 2)$.