

MATH 30 - Precalculus, Sec. 2497

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

[8] **1.** Write down a polynomial with x -intercepts at $x = 3$, $x = -2$, $x = 1$ and $x = -5$, and y -intercept at $y = -90$.

[8] **2.** If $p(-\sqrt{3}) = -\frac{3}{4}$, what is the remainder when we divide $p(x)$ by $(x + \sqrt{3})$? What theorem are you using?

[7] **3.** List all the possible rational roots of the polynomial $6x^4 + 2x^2 - 5x + 25$.

[12] **4.** Divide the following polynomials. 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)
$$\frac{x^4 - 4x^3 - x^2 + x - 8}{x^2 - x + 2}$$

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

[12] **5.** Factor the polynomial $x^5 - 5x^4 + x^3 + 13x^2 - 2x - 8$

[12] **6.** Solve the inequality $2x^3 + 4x - 1 < 5x^2$

[15] 7. For the rational function $f(x) = \frac{x^2 - 1}{x^2 - 9}$ find

- a) Whether it is even, odd or neither.
- b) Its Vertical Asymptotes, if any.
- c) Its Horizontal Asymptotes.
- d) Its x -intercepts with multiplicity, if any.
- e) Its y -intercept, if any.

NOTE: you do not need to graph it, so do not waste time doing the graph.

[9] 8. Find the following logarithms.

a) $\log_2 8 =$

c) $\log_6 6 =$

e) $\log_8 2 =$

b) $\log_3 81 =$

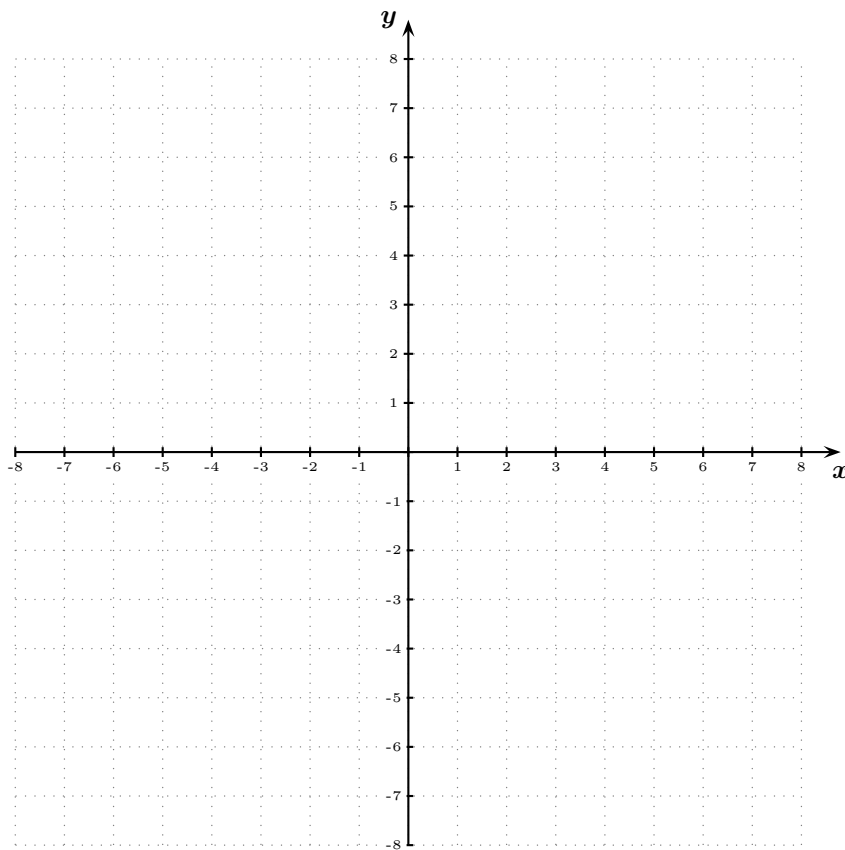
d) $\log_5 \frac{1}{25} =$

f) $\log_8 16 =$

[12] **9.** The function g has the following properties:

- a) It is neither even nor odd.
- b) It has a Vertical Asymptote at $x = -3$.
- c) As $x \rightarrow \pm\infty$, $g(x) \approx -\frac{2x^3}{x^3} = -2$ (in particular, g has a Horizontal Asymptote at $y = -2$).
- d) Its only x -intercepts are at $x = -2$ and at $x = -5$, both with multiplicity 1.
- e) Its y -intercept is at $y = -3$.

Sketch the graph of g in the axes below.



[10] **10.** Solve the inequality $\frac{x+5}{1-x} \geq 0$.