MA 121 ASSIGNMENT 1

Please show all of your work in answering the following:

1. Solve for \( x \): \( 5x - x^2 = -x \)

2. Use rules of exponents to find the exact value of \( \frac{x^3}{4} \)

3. Find an equation of the line that contains the points (1, -3) and (-1, 5).

4. Sketch the function \( f(x) = \begin{cases} -x + 1 & x < 0 \\ -3 & x = 0 \\ x^2 - 4x + 3 & x > 0 \end{cases} \)

5. Suppose that $5000 is invested at 8% compounded monthly. How much money is in your account at the end of 3 years?

6. Compute the following limits:
   a) \( \lim_{x \to 3} \frac{x^2 + x - 12}{x - 3} \)
   b) \( \lim_{x \to 0} \frac{x^2 + x - 12}{x - 3} \)
   c) \( \lim_{x \to 1} \frac{x^3 - 5x + 6}{5x^2 - 3} \)

7. Decide whether \( f(x) = \frac{x^2 + x - 12}{x - 3} \) is continuous at \( x = 0 \). Verify your answer.

8. Use the definition of derivative to find \( f'(x) \) when \( f(x) = x^2 - 5x + 1 \)

9. Find \( y' \) when
   a) \( y = 3x^4 + x^2 - 6x^3 \)
   b) \( y = (x^3 + 5x)(x^2 + 3x^3 - 2)^7 \)
   c) \( y = \frac{x^3 + 2}{2x^2 - 5x} \)
   d) \( y = \left( \frac{x^2 - 1}{x} \right)^4 \)
   e) \( y = 2x^3 \sqrt{3x + 7} \)
   f) \( y = \frac{x^3 + 4 \sqrt{x}}{(x - 2)^3} \)

(OVER)
10. Find $y'''$ when $y = \frac{-3}{x}$

11. Find an equation of the line tangent to the curve $y = \frac{4x}{1+x^2}$ at the point (0, 0).

12. Given a distance function $s(t) = t^4 + t^{\frac{2}{3}}$, find the velocity and acceleration at $t = 1$.

13. Given a cost function $C(x) = 600\sqrt{x^3 + 2}$ and a revenue function $R(x) = 500\sqrt{x^2 + 3}$, find the marginal profit function.