Math 211- Final Exam Review Part 1

1. Find the equation of a line passing through the points (7, 4) and (–3, 10)

2. Find the equation of a line tangent to $y = (7x - 20)^4$ at the point (3, 1)

3. Find $\lim_{x \to 2} \frac{x^2 - 4}{x^2 + x - 6}$

4. Find the following limits:

   a. $\lim_{x \to \infty} \frac{3x^2 + 5}{7x^2 + 2}$

   b. $\lim_{x \to \infty} \frac{4x^3 - 2x}{2 - 3x + 5x^4}$

   c. $\lim_{x \to \infty} \frac{x^3 - 6x}{2x + 3}$

Questions 5 through 8 deal with the function $f(x) = x^3 + 3x^2 - 9x - 4$

5. Find the relative maximum

6. Find the relative minimum

7. Find the inflection point

8. Find the y-intercept and sketch the graph

9. Find the absolute maximum and absolute minimum
for $f(x) = x^3 - 12x + 1$ over the interval $-1 \leq x \leq 4$

10. A movie theater charges $3.00 per ticket, and the average daily attendance is 200 people. The manager reduces the ticket price by $0.05 and finds the average attendance increases by 5 people. Assuming that for each additional 5-cent reduction the average attendance would rise by 5 people, find the number of 5-cent reductions that would result in maximum revenue.

11. $R(x) = 1{,}000 + 80x - 2x^2$ is the total daily revenue "R" from producing "x" microwave ovens. What is the largest possible daily revenue?

12. The profit "P" for producing "q" vacuum cleaners is $P(q) = 100 + 200q - q^2$ Use the marginal profit to estimate the profit from selling the 6^{th} vacuum.

Find the derivative in problems 13-14.

13. $y = \frac{8x-1}{2x-5}$

14. $f(x) = \frac{4}{(x^2-17)^7}$

Find the derivative in problems 15-17.

15. y = $7e^{-4x^2+3}$

16. y = ln($9x - 10x^2$)

17. h(x) = $12xe^{5x}$

18. The demand "D" for a commodity at price "p" is D(p) = q = 800 – $3p^2$.
Find the price elasticity of demand E(p) for p = $6.

19. How long would it take for $3,500 to grow to $7,000 if interest is paid at 2.5% per year, compounded monthly?

20. An insect culture grows exponentially. Suppose 1,000 insects are present initially, and after 4 hours 3,000 insects are present. At what time will 20,000 insects be present?

21. Evaluate: $\int (\sqrt[3]{x} - \frac{1}{x})dx$

Use "u" substitution to evaluate the integrals in problems 22-23.

22. $\int x \sqrt[3]{4+2x^2}\ dx$

23. a) $\int x^2 e^{3x^3} dx$ b) $\int 3x^2(x^3-5)^{10} dx$

24. Find the second derivative of y = ln$(3x^2+5)$ and simplify.

25. Evaluate $\int_{-1}^{3}(x^2-5)dx$

26. Evaluate $\int_{1}^{6} e^{12x} dx$

27. Find the present value of $10,500 accumulated over 8 years at an interest rate of 3% per year, compounded continuously.