1 Exam 1

1. Find the derivative using the limit definition of the function $f(x) = x^2 + 1$
2. Find the equation of the line tangent to the function $f(x) = e^{(3x)}$ at $x = 2$
3. It costs $C(x) = \frac{x+1}{x^2+1}$ dollars to produce x turtle ninja batons, what is the marginal production cost to make a baton? How about when $x = 49$ batons are made?
4. Find the derivative of the following functions: $f(x) = (2x-8)^7$ and $g(x) = \frac{xe^x-1}{(x+3)^2}$
5. Given the function $f(x) = 2x^3 - 15x^2 + 6$, find all local extrema and points of inflection. Label each extrema using an appropriate derivative test.
6. You have 125 ft of fencing to build a pen in the shape of a circular sector (see 2.9.8). The area of the sector is given by $rs/2$. What value of r maximizes the enclosed area?
7. Use Riemann sums to approximate the area under the curve given by $f(x) = x^2 + 3x + 2$ from x=0 to x=6 using three rectangles.
8. Integrate $\int_1^4 2(x-2)(x+3)dx$
9. Integrate $\int \frac{1}{x \ln x} dx$
10. Integrate $\int_1^2 9xe^{2x} dx$
11. Find the volume of the solid obtained by rotating the area under $f(x) = e^x + 3$ for $1 \geq x \geq 3$
12. Find the area between the curves $f(x) = x^2 + 3$ and $g(x) = \sqrt{4 - x^2}$ on $-2 \geq x \geq 2$
13. Find the present and future values of a continuous income stream of \$5000 per year for 12 years if money can earn 1.5% annual interest compounded continuously.

2 Exam 2

1. Find the derivative using the limit definition of the function $f(x) = 2x^2 - 1$

2. Find the equation of the line tangent to the function $f(x) = x^2 - 3x + 1$ at $x = 3$

3. If the cost of producing x turtle shell backpacks is $C(x) = (x^2 + 1)(e^{3x} - 2x)$, what is the marginal production cost of producing a backpack? How about when $x = 22$ back packs are made?

4. Find the derivative of the following functions: $f(x) = (2x - \ln(x))^{-2}$ and $g(x) = \frac{ln(2x) - x^2}{e^x}$

5. Given the function $f(x) = x \ln x$, find all local extrema and points of inflection. Label each extrema using an appropriate derivative test.

6. You own a small airplane which holds a maximum of 20 passengers. It costs you \$100 per flight from St. Thomas to St. Croix for gas and wages plus an additional \$6 per passenger for the extra gas required by the extra weight. The charge per passenger is \$30 each if 10 people charter your plane (10 is the minimum number you will fly), and this charge is reduced by \$1 per passenger for each passenger over 10 who goes (that is, if 11 go they each pay \$29, if 12 go they each pay \$28, etc.). What number of passengers on a flight will maximize your profits?

7. Use Riemann sums to approximate the area under the curve given by $f(x) = e^x + 2$ from x=0 to x=8 using four rectangles.

8. Integrate $\int_2^4 (\sqrt{x} - 2x + 1)dx$

9. Integrate $\int \frac{x+3}{x^2+6x-5} dx$

10. Integrate $\int_0^1 \frac{3}{16-x^2} dx$

11. Find the volume of the solid obtained by rotating the area under $f(x) = 1 + \frac{1}{x}$ for $1 \geq x \geq 3$

12. Find the average value of the function $f(x) = xe^x - 1$ on the interval $[0, 10]$

13. The demand and supply functions for a certain product are given by $p = 150 - .5q$ and $p = .002q^2 + 5.1$, where p is in dollars and q is the number of items. What is the total gains of trade from the equilibrium price?