Definite Integral

1. $\int_{-1}^{2}(1-x)dx$
   (Using Areas)

2. $\int_{0}^{9}(\frac{1}{3}x-2)dx$
   (Using Areas)

3. $\int_{-3}^{0}(1+\sqrt{9-x^2})dx$
   (Using Approximate Areas)

4. $\int_{0}^{1}(x^3-3x^2)dx$
   (Definition of a definite integral)

Find the derivative of the functions.

1. $\int_{x}^{1}\cos\sqrt{t}$

2. $\int_{1}^{\sqrt{x}}\frac{z^2}{z^4+1}dz$

3. $\int_{0}^{x^4}\cos^2\theta d\theta$

4. $\int_{sinx}^{1}\sqrt{1+t^2}dt$

Review

Find the extreme values of the function on the given interval.

1. $f(x) = x^3 - 6x^2 + 9x + 1$, [2,4]

2. $f(x) = x\sqrt{1-x}$, [-1,1]

3. $f(x) = \frac{3x-4}{x^2+1}$, [-2,2]

4. $f(x) = x + 2\cos x$, $[-\pi, \pi]$

Find the limit.

1. $\lim_{x\to\infty} \frac{3x^4+x-5}{6x^4-2x^2+1}$

2. $\lim_{x\to-\infty} \frac{\sqrt{4x^2+1}}{3x-1}$

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

4. $\lim_{x\to\infty} \sqrt{4x^2+3x} - 2x$

Sketch the following curves. **Make sure to show ALL work.**

1. $y = 2 - 3x - x^3$

2. $y = \frac{x^2}{x+8}$

3. $y = \sqrt[3]{x^2 + 1}$

Suppose that f is continuous on [0,4], $f(0) = 1$, and $2 \leq f'(x) \leq 5$ for all x in (0,4). Show that $9 \leq f(4) \leq 21$.

Find the point on the hyperbola $xy = 8$ that is closest to the point (3,0).

A hockey team plays in an arena with a seating capacity of 15,000 spectators. With the ticket price set at \$12, average attendance at a game has been 11,000. A market survey indicates that for each dollar the ticket price is lowered, average attendance will increase by 1000. How should the owners of the team set the ticket prices to maximize their revenue from ticket sales?

Find f.

1. $f'(x) = \sqrt{x^3} + \sqrt[3]{x^2}$
2. $f'(x) = 8x - 3\sec^2 x$
3. $f'(x) = 2x - 3\sin x$
4. $f'(x) = \frac{x^2+\sqrt{x}}{x}$

State both parts of the Fundamental Theorem of Calculus.

Evaluate the Riemann sum for $f(x) = x^2 - x$ on $0 \leq x \leq 2$ with four subintervals, taking the sample points to be right endpoints.

Use the definition of a definite integral (with right end-points) to calculate the value of the integral

$$\int_0^2 (x^2 - x)dx$$

Use the Fundamental Theorem to check your answer to the last question.