Homework 10 - Math 141, Frank Thorne (thornef@mailbox.sc.edu)

Due Wednesday, November 14

(a) What is an indefinite integral? Explain thoroughly.

(b) What is a definite integral? Explain thoroughly and draw a picture.

(c) Graph the function $y = x^2$, and estimate $\int_0^1 x^2 dx$ by dividing $[0, 1]$ into four, then six, then eight intervals.

(d) Graph the function $y = x^3$ and estimate $\int_0^1 x^3 dx$ by dividing $[0, 1]$ into two, three, four intervals.

(e) Graph the function $y = x$ and estimate $\int_0^1 x dx$ by dividing $[0, 1]$ into four, then six, then eight intervals. Then, evaluate $\int_0^1 x dx$ using geometry and compare your answers.

(f) Evaluate $\int_0^4 \sqrt{4 - (x - 2)^2} dx$ using geometry.

(g) Evaluate $\int_0^4 \sqrt{4x - x^2} dx$ using geometry.

(h) Evaluate $\int_0^3 4x dx$ using geometry.

(i) Evaluate $\int_{-2}^0 3x dx$ using geometry.

(j) Evalute $\int_{-4}^4 \frac{x}{2} dx$ using geometry.

(k) Evaluate $\int_{-2}^5 (x + 3) dx$ using geometry.

(l) What does the Fundamental Theorem of Calculus say, and why is it true? Explain carefully and throughly.

(m) Stewart, Ch. 4.9, 49-52, 57, 63. (Recall that the velocity function is the derivative of the position function, and the acceleration is the derivative of the velocity. In 63, use $a(t) = -10m/s^2$.)

(n) Stewart, Ch. 5.3, 4, 7, 8.

(o) Stewart, Ch. 5.3, 19-40, omit 34 (even).

(p) Stewart, Ch. 5.3, 43.

Additional problems:

(a) Stewart, Ch. 5.3, 19-40 (odd).

Bonus: 5.3, 76.