

Homework 12 - Math 141, Frank Thorne (thornef@mailbox.sc.edu)

Due Friday, November 11

- (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) Evaluate $\int_{-4}^4 \frac{x}{2} dx$ 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 thoroughly.
- (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 required, odd recommended.
- (p) Stewart, Ch. 5.3, 43.
- (q) Stewart, Ch. 5.4, 9-18 (omit 13), 35-38; even required, odd recommended.