Homework 7
MA 123 A2, Summer I 2010

Be first to report a math error for extra credit.

Read Stewart sections 5.1-5.3. Alternatively, read
`http://en.wikibooks.org/wiki/Calculus/Indefinite_integral`
and `http://en.wikibooks.org/wiki/Calculus/Definite_integral`.
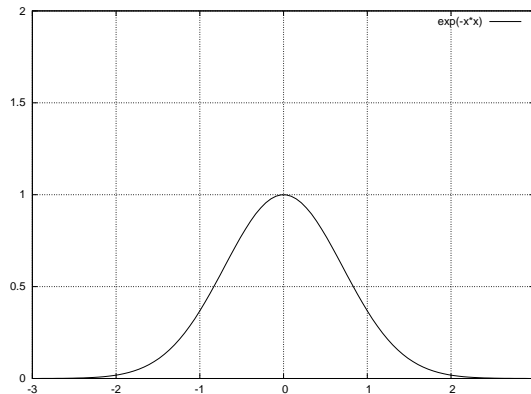Both sources contain ample selections of practice exercises.

Exercise 1. Find left and right Riemann sums S_l and S_r for $f(x) = x^2$ on the interval $[0, 5]$ with five terms each. Then, find

$$\int_0^5 x^2 dx$$

and compare the results. Find the estimate by taking the average: $\frac{S_l + S_r}{2}$.

Exercise 2. This exercise requires a calculator that can compute e^x.

The function $\int e^{-x^2} dx$ cannot be represented by an elementary algebraic expression, but we (and our computers) can integrate it numerically. Estimate $\int_0^2 e^{-x^2} dx$ by taking the average of the left and right Riemann sums, each with three terms.

Repeat, but now take six term sums. Compare with a more accurate value obtained by a computer: $0.882\ldots$

Exercise 3. Find $\int_{-2}^3 (x^2 - 3) dx$.

$[-\frac{10}{3}]$

1

Exercise 4. Find $\int_0^1 x^{\frac{4}{5}}dx$.

$[\frac{5}{9}]$

Exercise 5. Find $\int_1^2 (1+2y)^2 dy$.

$[\frac{49}{3}]$

Exercise 6. Find $\int_{-1}^1 e^{u+1}du$.

$[e^2 - 1]$

Exercise 7. Find $\int_0^2 |2x - 1| dx$.

Exercise 8. Find $\int_{-1}^0 (2x - e^x)dx$.

$[\frac{1}{e} - 2]$

Exercise 9. Find $\int_0^1 x(\sqrt[3]{x} + \sqrt[4]{x})dx$.

$[\frac{55}{63}]$

Exercise 10. Find $\int_0^{\frac{\pi}{4}} \sec^2 t \, dt$.

$[1]$