Math 152, Fall 2009, Formula Sheet for Exam 1

$$\sin(0) = 0 \ ; \quad \sin(\pi/6) = 1/2 \ ; \quad \sin(\pi/4) = \sqrt{2}/2 \ ; \quad \sin(\pi/3) = \sqrt{3}/2 \ ; \quad \sin(\pi/2) = 1$$
$$\cos(0) = 1 \ ; \quad \cos(\pi/6) = \sqrt{3}/2 \ ; \quad \cos(\pi/4) = \sqrt{2}/2 \ ; \quad \cos(\pi/3) = 1/2 \ ; \quad \cos(\pi/2) = 0$$

$$\cos^2 x + \sin^2 x = 1 \ ; \quad 1 + \tan^2 x = \sec^2 x \ ; \quad 1 + \cot^2 x = \csc^2 x$$
$$\sin(2x) = 2 \sin x \cos x \ ; \quad \cos(2x) = \cos^2 x - \sin^2 x$$
$$\cos^2 x = \frac{1}{2}\big(1 + \cos(2x)\big) \ ; \quad \sin^2 x = \frac{1}{2}\big(1 - \cos(2x)\big)$$
$$\sin A \cos B = \frac{1}{2}[\sin(A-B) + \sin(A+B)]$$
$$\sin A \sin B = \frac{1}{2}[\cos(A-B) - \cos(A+B)]$$
$$\cos A \cos B = \frac{1}{2}[\cos(A-B) + \cos(A+B)]$$

$$\int \sec x \, dx = \ln|\sec x + \tan x| + C \ ; \quad \int \csc x \, dx = \ln|\csc x - \cot x| + C$$

If T_N, M_N, S_N are the Trapezoidal, Midpoint and Simpson's approximations, then

$$T_N = \frac{\Delta x}{2}[f(x_0) + 2f(x_1) + 2f(x_2) + \cdots + 2f(x_{N-2}) + 2f(x_{N-1}) + f(x_N)] \ ;$$
$$M_N = \Delta x[f(c_1) + f(c_2) + \cdots + f(c_N)] \text{ where } c_j = (x_{j-1} + x_j)/2 \ ;$$
$$S_N = \frac{\Delta x}{3}[f(x_0) + 4f(x_1) + 2f(x_2) + 4f(x_3) + \cdots + 2f(x_{N-2}) + 4f(x_{N-1}) + f(x_N)] \ .$$

If $I = \int_a^b f(x)\, dx$ then:

$$|T_N - I| \le \frac{K_2(b-a)^3}{12N^2} \ ; \quad |M_N - I| \le \frac{K_2(b-a)^3}{24N^2} \ ; \quad |S_N - I| \le \frac{K_4(b-a)^5}{180N^4} \ .$$

Important: What is here, and what is not

The formulas above (or your instructor's modified version) will be given out with the first midterm. No other notes, and no electronic devices, may be used.

What is *not* here:

- Straightforward facts from Calc I which you *must* know to do computations in Calc II: derivatives and integrals of most standard functions, including trigonometric functions and their inverses, ln, and exp. (But the antiderivative of sec is given because it is particularly weird.)
- Formulas and procedures of Calc II that you have just learned, and which are being tested, such as integration by parts and partial fractions.