

## Math 152, Spring 2009, Formula Sheet for Exam 1

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

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$$\cos^2 x + \sin^2 x = 1 ; \quad 1 + \tan^2 x = \sec^2 x ; \quad 1 + \cot^2 x = \csc^2 x$$

$$\sin(2x) = 2 \sin x \cos x ; \quad \cos(2x) = \cos^2 x - \sin^2 x$$

$$\cos^2 x = \frac{1}{2}(1 + \cos(2x)) ; \quad \sin^2 x = \frac{1}{2}(1 - \cos(2x))$$

$$\sin A \cos B = \frac{1}{2}[\sin(A - B) + \sin(A + B)]$$

$$\sin A \sin B = \frac{1}{2}[\cos(A - B) - \cos(A + B)]$$

$$\cos A \cos B = \frac{1}{2}[\cos(A - B) + \cos(A + B)]$$

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

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

$$T_N = \frac{\Delta x}{2}[f(x_0) + 2f(x_1) + 2f(x_2) + \cdots + 2f(x_{N-2}) + 2f(x_{N-1}) + f(x_N)] ;$$

$$M_N = \Delta x[f(c_1) + f(c_2) + \cdots + f(c_N)] \text{ where } c_j = (x_{j-1} + x_j)/2 ;$$

$$S_N = \frac{\Delta x}{3}[f(x_0) + 4f(x_1) + 2f(x_2) + 4f(x_3) + \cdots + 2f(x_{N-2}) + 4f(x_{N-1}) + f(x_N)] .$$

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

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

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