MA 222 - EXAM 2 FORMULAS

Taylor Series: $f(x) = f(c) + f'(c)(x-c) + \frac{f''(c)}{2!}(x-c)^2 + \ldots + \frac{f^{(n)}(c)}{n!}\ (x-c)^n + \ldots$

Maclaurin Series: $f(x) = f(0) + f'(0)x + \frac{f''(0)}{2!}\ x^2 + \frac{f'''(0)}{3!}\ x^3 + \ldots + \frac{f^{(n)}(0)}{n!}\ x^n + \ldots$

Examples:

$$e^x = 1 + x + \frac{x^2}{2!} + \frac{x^3}{3!} + \frac{x^4}{4!} + \ldots \quad \text{(for all } x\text{)}, \qquad \sin x = x - \frac{x^3}{3!} + \frac{x^5}{5!} - \ldots \quad \text{(for all } x\text{)},$$

$$\ln(1+x) = x - \frac{x^2}{2} + \frac{x^3}{3} - \frac{x^4}{4} + \ldots \quad (-1 < x \leq 1), \qquad \cos x = 1 - \frac{x^2}{2!} + \frac{x^4}{4!} - \ldots \quad \text{(for all } x\text{)}$$

Fourier Series: If f is periodic with period $2p$,

$$f(t) = \frac{a_0}{2} + a_1 \cos\ \frac{\pi t}{p} + a_2 \cos\ \frac{2\pi t}{p} + \ldots + a_n \cos\ \frac{n\pi t}{p} + \ldots$$
$$+ b_1 \sin\ \frac{\pi t}{p} + b_2 \sin \frac{2\pi t}{p} + \ldots + b_n \sin\ \frac{n\pi t}{p} + \ldots$$

where

$$a_0 = \frac{1}{p}\int_{-p}^{p} f(t)dt, \quad a_n = \frac{1}{p}\int_{-p}^{p} f(t)\cos\ \frac{n\pi t}{p}\ dt \quad (n \neq 0), \quad b_n = \frac{1}{p}\int_{-p}^{p} f(t)\sin\ \frac{n\pi t}{p}\ dt$$