AMAT 219
Integrals

1. $\int \cot x\ dx = \ln|\sin x| + C$

2. $\int \sec x\ dx = \ln|\sec x + \tan x| + C$

3. $\int \csc x\ dx = \ln|\csc x + \cot x| + C$

4. $\int \sec^2 x\ dx = \tan x + C$

5. $\int \csc^2 x\ dx = -\cot x + C$

6. $\int \sec x\ \tan x\ dx = \sec x + C$

7. $\int \csc x\ \cot x\ dx = -\csc x + C$

8. $\int \dfrac{1}{\sqrt{1-x^2}}\ dx = \arcsin x + C$

9. $\int \dfrac{1}{x^2+1}\ dx = \arctan x + C$

10. $\int \dfrac{1}{x\sqrt{x^2-1}}\ dx = \text{arcsec } x + C$

Basic Trigonometric Identities

$i)\ \cos^2\theta + \sin^2\theta = 1$ $\qquad ii)\ 1 + \tan^2\theta = \sec^2\theta$ $\qquad iii)\ \cot^2\theta + 1 = \csc^2\theta$

$i)\ \sin 2\theta = 2\sin\theta\cos\theta$ $\qquad ii)\ \cos 2\theta = 2\cos^2\theta - 1 = 1 - 2\sin^2\theta$

$iii)\ \cos^2\theta = \dfrac{1}{2}(1+\cos 2\theta)$ $\qquad iv)\ \sin^2\theta = \dfrac{1}{2}(1-\cos 2\theta)$

Approximations to $\int_a^b f(x)\ dx$

Trapezoid Rule: $T_n = h\left[\frac{1}{2}f(x_0) + f(x_1) + \ldots + f(x_{n-1}) + \frac{1}{2}f(x_n)\right]$

Midpoint Rule: $M_n = h\displaystyle\sum_{k=1}^{n} f(m_k)$

Simpson's Rule: $S_n = h/3\left[f(x_0) + f(x_n) + 4\sum_{odds}f(x) + 2\sum_{evens}f(x)\right]$

where $h = (b-a)/n$ $\quad |x_k - x_{k-1}|$