Ch. 4 Formula Sheet

Summation Formulas:

1) $\sum_{i=1}^{n} 1 = n$

2) $\sum_{i=1}^{n} i = \dfrac{n(n+1)}{2}$

3) $\sum_{i=1}^{n} i^2 = \dfrac{n(n+1)(2n+1)}{6}$

4) $\sum_{i=1}^{n} i^3 = \dfrac{n^2(n+1)^2}{4}$

5) $\sum_{i=1}^{n} ca_i = c \sum_{i=1}^{n} a_i$

Area using Limit Definition

$$\lim_{n \to \infty} \sum_{i=1}^{n} (width) * f(left\ endpoint + width * i)$$

$width = \dfrac{b-a}{n}$

Trapezoid Area:

$Area = \frac{1}{2} w(h_1 + h_2)$

Derivative Formulas:

Power Rule:

$$\frac{d}{dx} x^n = nx^{n-1}$$

Trig Derivatives:

$\dfrac{d}{dx} \sin u = \cos u * u'$	$\dfrac{d}{dx} \cos u = -\sin u * u'$
$\dfrac{d}{dx} \tan u = \sec^2 u * u'$	$\dfrac{d}{dx} \cot u = -\csc^2 u * u'$
$\dfrac{d}{dx} \sec u = \sec u \tan u * u'$	$\dfrac{d}{dx} \csc u = -\csc u \cot u * u'$

Integral Formulas:

Power Rule:

$$\int u^n du = \frac{u^{n+1}}{n+1} + C$$

FFTC (First Theorem)

$$\int_a^b f(x)dx = F(b) - F(a)$$

SFTC (Second Theorem)

$$\frac{d}{dx} \int_a^{p(x)} f(t)dt = f(p(x)) * p'(x)$$

*variations of FFTC

$$\int_a^b v(t)dt = x(b) - x(a)$$

$$x(b) = x(a) + \int_a^b v(t)dt$$

final position = initial position + displacement

$$v(b) = v(a) + \int_a^b a(t)dt$$

variations of FFTC (continued)…

$$\int_a^b f'(x)dx = f(b) - f(a)$$

$$\int_a^b f''(x)dx = f'(b) - f'(a)$$

$$\int_a^b a(t)dt = v(b) - v(a)$$

Trig Integrals:

$\int \sin u\, du = -\cos u + C$

$\int \cos u\, du = \sin u + C$

$\int \sec^2 u\, du = \tan u + C$

$\int \sec u \tan u\, du = \sec u + C$

$\int \csc^2 u\, du = -\cot u + C$

$\int \csc u \cot u\, du = -\csc u + C$

Average Value Theorem

$$Avg.\,Value = \frac{1}{b-a} \int_a^b f(x)dx$$