

Calc 12 - Chp 5-8 Final Review.

Note Title

2015-05-29

Area Under the Curve

- find zeros! (to split up shapes or integrals)
Remember - answer should not be zero or negative
- Use shapes to find area.
- $\int |f(x)| dx$
- Use Riemann, use $\text{abs}(f(x))$ if you can't find zeroes.
- as $n \rightarrow \infty$, LRAM, MRAM, RRAM will yield same answer.
- use table formula.

Definite Integrals (D.I.)

- negative answers are okay
- Integral Properties.
- Average (Mean) Value.
- Mean Value Theorem for Definite Integrals
existence theorem.
- FTC (Fundamental Theorem of Calculus.)
- derivative of D.I. (Chain Rule)
- FTC Part 2 - evaluating D.I.

Trapezoidal & Simpson's Rule for D.I.

- use tables.

Indefinite Integrals

- constant of integration
- antiderivative tables.
- properties of integrals
- separable D.E. (separate variables, integrate both sides)

Integrals

- substitution (chain rule)
 - be careful with limits of integration.
- integration by parts
 - be careful about multiple applications
 - let polynomial be 'u' and trig or exp be 'dv'

- exponential growth/decay.
 - general solution: $y = A_0 e^{kt}$
 - half-life: $k = -\ln 2 / \lambda$, λ - is time for half-life
 - Newton's Law of Cooling:

$$T(t) = (T_0 - T_s) e^{-kt} + T_s$$
- population growth
 - unrealistic
 - use logistic growth to cap growth:

$$y = \frac{M}{1 + A e^{-kt}}, \quad A = \frac{M}{P_0} - 1, \quad M - \text{carrying capacity.}$$

Hooke's Law: $F = kx$ $W = \int_a^b kx \, dx$

- be careful with a, b because you need to subtract the natural length.

areas between curves given interval/or not.

- find zeroes, partition
- higher fn - lower fn - $\int |f(x) - g(x)| \, dx$
- integrate wrt something other than x

Volumes by cross section.

- determine what direction will slices have an easy formula
- disc/washer for when fns are in terms of the same variable as that we are integrating wrt.
- shell for when fns are in terms of the dependent variable as opposed to that we are integrating wrt.
- remember when rotating about something other than x -axis or y -axis, the number to calculate the proper radius.

L'Hopital's - all forms.

Improper Integrals

- use limits
- split at vertical asymptotes
- limit at $\pm \infty$

Convergence

- Direct Comparison Test.
- Limit Comparison Test

Partial Fractions

- power of D must be greater than power of N
- if not, long division.
- set up and solve system of linear equations.
- substitute coefficients and integrate.
- be careful with factors of higher powers.