Math 128 : Calculus 2 for the Sciences **Winter 2016**

Lecture 8: January 20, 2016

Lecturer: Jen Nelson *Notes By: Harsh Mistry*

8.1 Improper Integral Type 1

Infinite Interval $a = -\infty$ and/or $b = \infty$
In General :

- $\int_a^\infty f(x)dx = \lim_{b\to\infty} \int_a^b f(x)dx$, provided f is continuous on [a , ∞) and the limit exists
- $\int_{-\infty}^b f(x)dx = \lim_{a\to-\infty} \int a^b f(x)dx$, provided f is continuons on $-\infty, b$] and the limit exists
- $\int_{-\infty}^\infty f(x)dx = \lim_{a\to-\infty} \int_a^c f(x)dx + \lim_{b\to\infty} \int_c^b f(x)dx$ provided that both limits exists

If the limit exists we say the improper integral is equal to the limt or is Convergent and converges. If the limit does not exist, the improper integral has no value and is divergent

8.2 Improper Integeral Type 2

Discontinuous Integrand (f discontinuous on [a,b])
In General :l

- If f is continuous on [a,b) but not at b then
  $\int_a^b f(x)dx = \lim_{c\to b^-} \int_a^c f(x)dx$, provided the limit exists
- If f is continuous on (a,b] but not at a then
  $\int_a^b f(x)dx = \lim_{c\to a^+} \int_c^b f(x)dx$, provided the limit exists
- If f is continuous on (a,b] but not at d, where $a < d < b$, then
  $\int_a^b f(x)dx = \lim_{c\to d^-} \int_a^c f(x)dx + \lim_{c\to d^+} \int_c^b f(x)dx$ provided both limit exist.

End of Lecture Notes
Notes By : Harsh Mistry