DATE: _____

Improper Integrals

Find area under curve $y = \frac{1}{x^3}$ from:

a) $x = 1$ to $x = 10$

b) $x = 1$ to $x = 100$

c) $x = 1$ to $x = 1000$

d) Use your answers from **(a)**, **(b)**, and **(c)** to estimate $\int_1^\infty \frac{1}{x^3}\,dx$

Improper Integrals

Improper Integrals – integrals w/infinite limits of integration

If $f(x)$ is continuous on given interval limits, then

① $\int_a^\infty f(x)\,dx$

② $\int_{-\infty}^b f(x)\,dx$

③ $\int_{-\infty}^\infty f(x)\,dx$

Example 1:

$\int_1^{\infty} \frac{dx}{\sqrt{x}}$

Example 2:

$\int_{-\infty}^{-1} \frac{dx}{x^2}$

Example 3:

$\int_1^{\infty} \frac{5x+6}{x^2+2x} dx$

Example 4:

$\int_0^\infty (x+1)e^{-x}\,dx$

Example 5:

$\int_{-\infty}^\infty 2xe^{-x^2}\,dx$