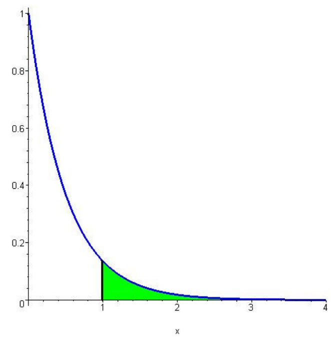
Infinite Upper Limit

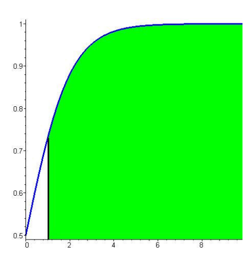
$$\int_a^\infty f(x)\,dx = \lim_{b\to\infty}\int_a^b f(x)\,dx$$

$$\int_1^\infty e^{-2x}\,dx$$



Infinite Upper Limit

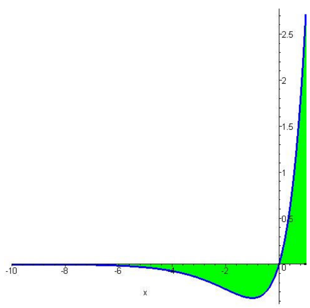
$$\int_1^\infty \frac{e^x}{1+e^x}\,dx = \lim_{b\to\infty}\int_1^b \frac{e^x}{1+e^x}\,dx$$



Infinite Lower Limit

$$\int_{-\infty}^{b} f(x)\,dx = \lim_{a\to-\infty}\int_{a}^{b} f(x)\,dx$$

$$\int_{-\infty}^{1} xe^{x}\,dx = \lim_{a\to-\infty}\int_{a}^{1} xe^{x}\,dx$$



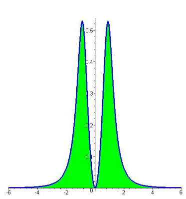
Math 104 – Rimmer
8.8 Improper Integrals

Infinite Upper and Lower Limit

$$\int_{-\infty}^{\infty} f(x)\,dx = \int_{-\infty}^{c} f(x)\,dx + \int_{c}^{\infty} f(x)\,dx \text{ ;} c \text{ any real number}$$

$$\int_{-\infty}^{\infty} f(x)\,dx = \lim_{a\to-\infty}\int_{a}^{c} f(x)\,dx + \lim_{b\to\infty}\int_{c}^{b} f(x)\,dx$$

$$\int_{-\infty}^{\infty} \frac{x^2}{1+x^6}\,dx$$



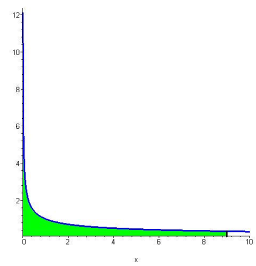
Infinite Discontinuity at Lower Limit

$$\int_a^b f(x)\,dx = \lim_{t \to a^+} \int_t^b f(x)\,dx$$

$f(a) \to$ infinite discontinuity

$$\int_0^9 \frac{dx}{\sqrt{x}}$$

$f(0) \to$ infinite discontinuity



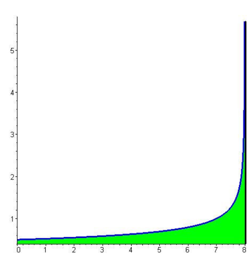
Infinite Discontinuity at Upper Limit

$$\int_a^b f(x)\,dx = \lim_{t \to b^-} \int_a^t f(x)\,dx$$

$f(b) \to$ infinite discontinuity

$$\int_0^8 \frac{dx}{\sqrt[3]{8-x}}$$

$f(8) \to$ infinite discontinuity



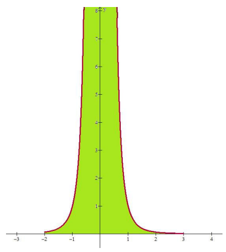
Infinite Discontinuity inside the interval

$$\int_a^b f(x)\,dx = \int_a^c f(x)\,dx + \int_c^b f(x)\,dx = \lim_{t\to c^-}\int_a^t f(x)\,dx + \lim_{t\to c^+}\int_t^b f(x)\,dx$$

$f(c)\to$infinite discontinuity
$a<c<b$

$$\int_{-2}^{3}\frac{dx}{x^4}$$

$f(0)\to$infinite discontinuity
-2<0<3



Doubly Improper

$$\int_0^\infty f(x)\,dx = \int_0^c f(x)\,dx + \int_c^\infty f(x)\,dx = \lim_{a\to 0^+}\int_a^c f(x)\,dx + \lim_{b\to\infty}\int_c^b f(x)\,dx$$

$f(0)\to$infinite discontinuity

$$\int_0^\infty \frac{e^{-1/x}}{x^2}\,dx$$

$f(0)\to$infinite discontinuity