Find $\int_1^{\infty} \frac{1}{x^2}\,dx$

① $\int_1^b \frac{1}{x^2}\,dx = \int_1^b x^{-2}\,dx$

$= -x^{-1}\Big|_1^b$

$= -\frac{1}{x}\Big|_1^b$

$= -\frac{1}{b} - (-1)$

$= 1 - \frac{1}{b}$

② $\int_1^{\infty} \frac{1}{x^2}\,dx = \lim_{b\to\infty} \int_1^b \frac{1}{x^2}\,dx$

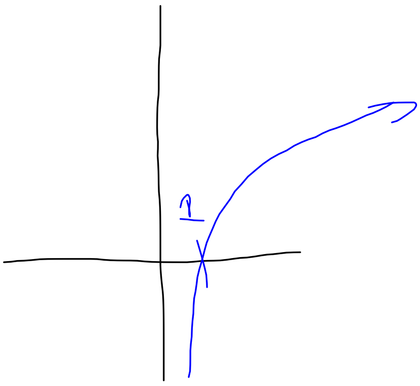
$= \lim_{b\to\infty} \left(1 - \frac{1}{b}\right)$

$= 1$

$$\int_0^b e^{-x}\,dx =$$
$$=$$
$$=$$
$$= 1 - e^{-b}$$

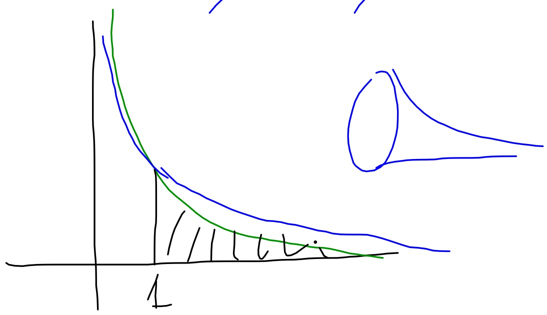
$$\int_0^\infty e^{-x}\,dx = \lim_{b\to\infty} \int_0^b e^{-x}\,dx$$
$$= \lim_{b\to\infty} \left(1 - e^{-b}\right)$$
$$=$$

$$\int_1^\infty \frac{1}{x}\,dx$$ does not exist



$$\int_1^b \frac{1}{x}\,dx = \ln x \Big|_1^b$$

$$= \cancelto{\infty}{\ln b} - \cancelto{0}{\ln 1}$$



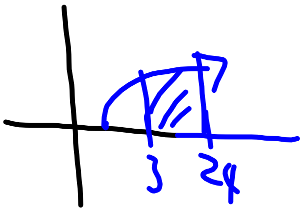
$$\int_{x=3}^{24} \sqrt{x+1}\,dx = \int_{u=2}^{5} \sqrt{u^2}\,2u\,du$$

$u^2 = x+1$

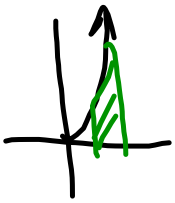
$2u\,du = 1\,dx$

When $x=3$, $u=2$

When $x=24$, $u=5$



$$= 2\int_{2}^{5} u^2\,du$$



$$\int_1^5 \left(\frac{x+3}{2}\right)^2 dx = 2\int_1^5 \left(\frac{x+3}{2}\right)^2 \frac{1}{2}\, dx$$

$$= 2\int_2^4 u^2\, du$$

$u = \dfrac{x+3}{2} = \dfrac{x}{2} + \dfrac{3}{2}$

$= \dfrac{1}{2}x + \dfrac{3}{2}$

$du = \dfrac{1}{2}dx$

$\dfrac{a \pm b}{c} = \dfrac{a}{c} \pm \dfrac{b}{c}$

1 $P(X=4) = b^*(4;2,0.52) = 0.1869$

$$\lim_{x \to \infty} x^n e^{-x} = 0 \quad \text{for any } n > 0$$