

Problem 3

use ratio-of-uniforms generator: $x = \frac{y}{u}$ $y = v$ $0 < u < \sqrt{\exp(-v)}$ ($0 \leq u \leq 1$)

$$P(x) = e^{-x} \Rightarrow 0 < u < \sqrt{\exp(-v)}$$

$$u^2 < \exp(-\frac{v}{u})$$

$$v^2 < \frac{u^2}{u^2} \exp(-\frac{v}{u})$$

$$v^2 < x^2 \exp(-x)$$

$$|y| < |xe^{-\frac{x}{2}}| \rightarrow \text{when } x=2 \quad (xe^{-\frac{x}{2}})_{\max} = 2e^{-1} \approx 0.7358$$

$$\Rightarrow |y| \leq 0.7358$$

$$-0.7358 \leq v \leq 0.7358$$

$$\text{and } 0 \leq u \leq 1$$