

Problem 1.

$$a) \int_0^5 x e^{-x} dx = -x e^{-x} \Big|_0^5 - \int_0^5 -e^{-x} dx = -x e^{-x} \Big|_0^5 - e^{-x} \Big|_0^5$$

$$u = x \\ dv = e^{-x} dx$$

$$du = dx \\ v = -e^{-x}$$

$$= -5e^{-5} - e^{-5} + 1$$

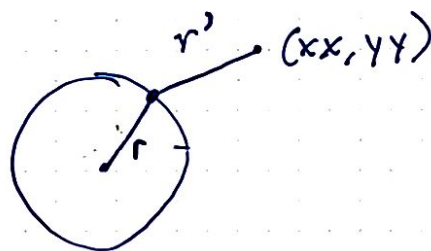
$$= \boxed{-6e^{-5} + 1}$$

$$= 0.959572318005$$

Problem 2.

$$b) \text{ line density } \lambda = \frac{Q}{2\pi r}$$

$$dq = \lambda r d\theta$$



$$V(xx, yy) = k \int \frac{dq}{r'}$$

$$= k \int_0^{2\pi} \frac{\lambda r d\theta}{\sqrt{(xx - r \cos \theta)^2 + (yy - r \sin \theta)^2}}$$

$$= k \lambda r \int_0^{2\pi} \frac{d\theta}{\sqrt{(xx - r \cos \theta)^2 + (yy - r \sin \theta)^2}}$$