

Solution to 3.3.14

(a.) Use Markov's inequality:

$$P(X \geq 50,000) \leq \frac{\mu}{50,000} = \frac{10,000}{50,000} = \frac{1}{5}$$

(b.) Use Chebychev's inequality:

$$P(|X - \mu| \geq kSD(X)) \leq \frac{1}{k^2}$$

$$P(X \geq kSD(X) + E(X)) \leq \frac{1}{k^2}$$

As $SD(X) = 8000$ and $\mu = 10,000$ and we want $kSD(X) + E(X) = 50,000$, so $k = 5$. Thus:

$$P(X \geq 50,000) \leq \frac{1}{25}$$