Problem Set 41 Answers

1. Let $X$ denote the waiting time. The Markov inequality implies $P(X > 8) \leq 6.3/8 = 0.7875$.

2a. Let $X$ denote the height. By the Markov inequality, we have $P(X \geq 6) \leq 5.2/6 = 0.86667$.

2b. By the Chebyshev inequality, we have $P(|X - 5.2| > .2) \leq (0.05)^2/(.2)^2 = 0.0625$.

3a. Let $X$ denote the salary. By the Markov inequality, we have $P(X \geq 50,000) \leq 47,500/50,000 = 19/20 = 0.95$.

3b. By the Chebyshev inequality, we have $P(|X - 47,500| > 2500) \leq (1000)^2/(2500)^2 = 4/25 = 0.16$.

4. Among the 40 selected students, let $X$ denote the number that were close enough to have seen the clock fall. Then $X$ is a Binomial random variable with $n = 40$ and $p = 0.02$. So the desired probability is $P(X \geq 2) = 1 - P(X = 0) - P(X = 1) = 1 - \binom{40}{0} (0.02)^0 (0.98)^{40} - \binom{40}{1} (0.02)^1 (0.98)^{39} = 0.1905$. 