CS 333202: Probability and Statistics
HW8 Part II

1. (a) $\Phi(0.8333) = 0.7977$

   (b) $2\Phi(1) - 1 = 0.6827$

   (c) $1 - \Phi(0.3333) = 0.3695$

   (d) $\Phi(1.6667) = 0.9522$

   (e) $1 - \Phi(1) = 0.1587$

2. (a) $P\{U > 0.1\} = 9/10$

   (b) $P\{U > 0.2 \mid U > 0.1\} = P\{U > 0.2\}/P\{U > 0.1\} = 8/9$

   (c) $P\{U > 0.3 \mid U > 0.2, U > 0.1\} = P\{U > 0.3\}/P\{U > 0.2\} = 7/8$

   (d) $P\{U > 0.3\} = 7/10$

3. (a) The problem is equivalent to choosing a random number X from $(0, \ell)$. The desired probability is

$$P(X \leq \tfrac{\ell}{3}) + P(X \geq \tfrac{2\ell}{3}) = \tfrac{\ell/3}{\ell} + \tfrac{\ell-(2\ell/3)}{\ell} = \tfrac{2}{3}$$

   (b) Let X be a random number from $(0, \ell)$. The probability of the desired event is

$$\begin{aligned} P(\min(X, \ell - X) \geq \tfrac{\ell}{3}) &= P(X \geq \tfrac{\ell}{3}, \ell - X \geq \tfrac{\ell}{3}) \\ &= P(\tfrac{\ell}{3} \leq X \leq \tfrac{2\ell}{3}) = \tfrac{\frac{2\ell}{3} - \frac{\ell}{3}}{\ell} = \tfrac{1}{3} \end{aligned}$$