

**Tutorial 4: Solutions**

1. (a)

$$\begin{aligned}\mathbf{P}(X \leq 1.5) &= \Phi(1.5) \\ &= 0.9332.\end{aligned}$$

$$\begin{aligned}\mathbf{P}(X \leq -1) &= 1 - \mathbf{P}(X \leq 1) \\ &= 1 - \Phi(1) \\ &= 1 - 0.8413 \\ &= 0.1587.\end{aligned}$$

(b)

$$\begin{aligned}\mathbf{E}\left[\frac{Y-1}{2}\right] &= \frac{1}{2}(\mathbf{E}[Y] - 1) \\ &= 0.\end{aligned}$$

$$\begin{aligned}\text{var}\left(\frac{Y-1}{2}\right) &= \text{var}\left(\frac{Y}{2}\right) \\ &= \frac{1}{4}\text{var}Y \\ &= 1.\end{aligned}$$

Thus, the distribution of  $\frac{Y-1}{2}$  is  $\mathcal{N}(0, 1)$ .

(c)

$$\begin{aligned}\mathbf{P}(-1 \leq Y \leq 1) &= \mathbf{P}\left(\frac{-1-1}{2} \leq \frac{Y-1}{2} \leq \frac{1-1}{2}\right) \\ &= \Phi(0) - \Phi(-1) \\ &= \Phi(0) - (1 - \Phi(1)) \\ &= 0.3413.\end{aligned}$$

2. Example 3.15, page 169 in text. See solutions in the text.

3. Problem 3.20, page 191 in text. See online solutions.

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