Exercise 7E

1 $X \sim \text{Po}(4)$, $X \geq 7$

2 $X \sim \text{Po}(9)$, $X \geq 15$

3 $X \sim \text{Po}(3.5)$, $X = 0$

4 $X \sim \text{Po}(5)$
$P(X \geq 7) = 0.2378 > 0.025$
Therefore do not reject H_0.

5 $X \sim \text{Po}(8)$
$P(X \geq 11) = 0.1841 > 0.05$
Therefore do not reject H_0.

6 $X \sim \text{Po}(6)$
$P(X \leq 4) = 0.2851 > 0.05$
Therefore do not reject H_0.

7 $X \sim \text{Po}(4)$
$P(X \geq 8) = 0.0511 < 0.1$
Therefore reject H_0.

8 a $H_0: \lambda = 4$, $H_1: \lambda > 4$

b Assuming that $X \sim \text{Po}(4)$
$P(X \geq 8) = 0.0511$
$P(i \geq 9) = 0.0214$
So $C = \{X \geq 9\}$

c 8 is not in the critical region, so the scientist concluded that there was insufficient evidence to suggest an increase in the number of storms.

9 Let X represent the number of sales in an eight-week period.
$H_0: \lambda = 80$
$H_1: \lambda < 80$
Under H_0,
$X \sim \text{Po}(80)$
Approximating with the normal distribution
$Y \sim N(80, 80)$

$$P(X \leq 55) = P(Y < 55.5) = P\left(Z < \frac{55.5 - 80}{\sqrt{80}}\right)$$
$$= P(Z < -2.7391...)$$
$$= 0.003079\ldots$$
$$> 0.05$$

Therefore reject H_0.

10 $H_0: \lambda = 20$, $H_1: \lambda < 20$

Let W be the number of workers who are absent at least one day per month.

$W \sim B(100, 0.02)$

Using the approximation

$Y \sim Po(2)$

$P(Y < 20) = 1$

Therefore reject H_0.

There is evidence that the percentage of workers who are absent for at least 1 day per month is less than 20%.