A2(c)

The number of goals scored in six games is now given as $[2, 4, 6, 0, 1, 8]$. To find the updated numerical estimate of λ, we use the maximum likelihood estimate:

$$\hat{\lambda} = \frac{1}{n} \sum_{i=1}^{n} x_i.$$

Substituting the values:

$$\hat{\lambda} = \frac{2 + 4 + 6 + 0 + 1 + 8}{6} = \frac{21}{6} = 3.5.$$

Thus, the updated λ is:

$$\hat{\lambda} = 3.5.$$

Next, we calculate the probability that the team scores 6 goals in their 7th game. The number of goals per game follows a Poisson distribution, with probability mass function:

$$P(X = x \mid \lambda) = \frac{\lambda^x e^{-\lambda}}{x!}.$$

Substituting $x = 6$ and $\lambda = 3.5$:

$$P(X = 6 \mid \lambda = 3.5) = \frac{3.5^6 e^{-3.5}}{6!}.$$

We compute this step by step: 1. Compute 3.5^6:

$$3.5^6 = 1838.265625.$$

2. Compute $e^{-3.5}$:

$$e^{-3.5} \approx 0.030197.$$

3. Compute $6!$:

$$6! = 720.$$

Substitute these values:

$$P(X = 6 \mid \lambda = 3.5) = \frac{1838.265625 \cdot 0.030197}{720}.$$

Simplify:

$$P(X = 6 \mid \lambda = 3.5) \approx \frac{55.459}{720} \approx 0.0771.$$

Thus, the probability that the team scores 6 goals in their 7th game is approximately:

$$P(X = 6 \mid \lambda = 3.5) \approx 0.0771 \quad (7.71\%).$$

$\blacksquare$