A2(b)

To find the numerical estimate of λ, we use the maximum likelihood estimate:

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

The number of goals in the first five games is given as $[2, 4, 6, 0, 1]$. Substituting these values:

$$\hat{\lambda} = \frac{2+4+6+0+1}{5} = \frac{13}{5} = 2.6.$$

Thus, the estimated λ is:

$$\hat{\lambda} = 2.6.$$

Next, we calculate the probability that the team scores 6 goals in their next 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 $\lambda = 2.6$:

$$P(X = 6 \mid \lambda = 2.6) = \frac{2.6^6 e^{-2.6}}{6!}.$$

We compute this step by step: 1. Compute 2.6^6:

$$2.6^6 = 308.915776.$$

2. Compute $e^{-2.6}$:

$$e^{-2.6} \approx 0.07427.$$

3. Compute $6!$:

$$6! = 720.$$

Substitute these values back:

$$P(X = 6 \mid \lambda = 2.6) = \frac{308.915776 \cdot 0.07427}{720}.$$

Simplify:

$$P(X = 6 \mid \lambda = 2.6) \approx \frac{22.93885}{720} \approx 0.03187.$$

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

$$P(X = 6 \mid \lambda = 2.6) \approx 0.03187 \quad (3.187\%).$$

■