

1. See code
2. A

$$\frac{\partial l}{\partial \beta_j} = \sum_i (\omega_i - y_i) x_{ij} = \sum g_i$$

B

$$E(n g_i) = n E(g_i) = n \sum_k P(g_i = k) k = n \sum_i \frac{g_i}{n} = \frac{\partial l}{\partial \beta_j}$$

- C See code
- D See code