(a) Two ponds, A and B, each contain a large number of fish. It is known that 2.4% of fish in pond A are carp and 1.8% of fish in pond B are carp. Random samples of 50 fish from pond A and 60 fish from pond B are selected.

Use appropriate Poisson approximations to find the following probabilities.

(i) The samples contain at least 2 carp from pond A and at least 2 carp from pond B. [3]

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(ii) The samples contain at least 4 carp altogether. [3]

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(b) The random variables X and Y have the distributions $\text{Po}(\lambda)$ and $\text{Po}(\mu)$ respectively. It is given that

- $\text{P}(X = 0) = [\text{P}(Y = 0)]^2$,
- $\text{P}(X = 2) = k[\text{P}(Y = 1)]^2$, where k is a non-zero constant.

Find the value of k. [4]