AQA – Poisson distribution – A2 Further Mathematics Statistics

1. June/2020/Paper_3/No.5

    Emily claims that the average number of runners per minute passing a shop during a long distance run is 8

    Emily conducts a hypothesis test to investigate her claim.

    (a)   State the hypotheses for Emily's test.

    [1 mark]

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    (b)   Emily counts the number of runners, X, passing the shop in a randomly chosen minute.

    The critical region for Emily's test is $X \leq 2$ or $X \geq 14$

    During a randomly chosen minute, Emily counts 3 runners passing the shop.

    Determine the outcome of Emily's hypothesis test.

    [3 marks]

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(c)   The actual average number of runners per minute passing the shop is 7

Find the power of Emily's hypothesis test, giving your answer to
three significant figures.

[3 marks]

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2. June/2020/Paper_3/No.8

The number of telephone calls received by an office can be modelled by a Poisson distribution with mean 3 calls per 10 minutes.

(a) Find the probability that:

(a) (i) the office receives exactly 2 calls in 10 minutes;

[1 mark]

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(a) (ii) the office receives more than 30 calls in an hour.

[3 marks]

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(b) The office manager splits an hour into 6 periods of 10 minutes and records the number of telephone calls received in each of the 10 minute periods.

Find the probability that the office receives exactly 2 calls in a 10 minute period exactly twice within an hour.

[3 marks]

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(c) The office has just received a call.

(c) (i) Find the probability that the next call is received more than 10 minutes later.

[3 marks]

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(c) (ii) Mahah arrives at the office 5 minutes after the last call was received.

State the probability that the next call received by the office is received more than 10 minutes later.

Explain your answer.

[2 marks]

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