<u>AQA – Continuous random variables – A2 Further Mathematics Statistics</u>

1. June/2020/Paper_3/No.1

The continuous random variable X has probability density function

$$f(x) = \begin{cases} \frac{1}{5} & 1 \le x \le 6 \\ 0 & \text{otherwise} \end{cases}$$

Find $P(X \ge 3)$

Circle your answer.

[1 mark]

$$\frac{1}{5}$$

2. June/2020/Paper 3/No.9

The continuous random variable X has the cumulative distribution function shown below.

$$F(x) = \begin{cases} 0 & x < 0 \\ \frac{1}{62}(4x^3 + 6x^2 + 3x) & 0 \le x \le 2 \\ 1 & x > 2 \end{cases}$$

The discrete random variable *Y* has the probability distribution shown below.

у	2	7	13	19
P(Y = y)	0.5	0.1	0.1	0.3

The random variables X and Y are independent.

Find the exact value of $E(X^3 + Y)$.	[6 marks	

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3.	June/20	9/Paper_3/No.4 A random variable X has a rectangular distribution.				
		The mean of X is 3 and the variance of X is 3				
	(a)	Determine the probability density function of X .				
		Fully justify your answer.	[5 marks]			

(b) A 6 metre clothes line is connected between the point *P* on one building and the point *Q* on a second building.

Roy is concerned the clothes line may break. He uses the random variable X to model the distance in metres from ${\it P}$ where the clothes line breaks.

(b) (i) State a criticism of Roy's model.

[1 mark]

(b) (ii) On the axes below, sketch the probability density function for an alternative model for the clothes line.

[1 mark]



4. June/2019/Paper_3/No.5

An insurance company models the claims it pays out in pounds (\pounds) with a random variable X which has probability density function

$$f(x) = \begin{cases} \frac{k}{x} & 1 < x < a \\ 0 & \text{otherwise} \end{cases}$$

(a) The median claim is £200

Show that $k = \frac{1}{2 \ln 200}$

[3 marks]	2 in 200

(b) Find P(X < 2000), giving your answer to three significant figures.

[2 marks]

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(c)	The insurance company finds that the maximum possible claim is £2000 and they decide to refine their probability density function.		
	Suggest how this could be done.	[2 marks	