

**MATHS METHODS 3 & 4**

**TRIAL** **EXAMINATION 1**

**SOLUTIONS**

**2019**

# Question 1 (3 marks)

1. 



**(1 mark)**

1. 

 

**(1 mark)**

**(1 mark)**

**Question 2** (3 marks)



**(1 mark)**

**(1 mark)**

**(1 mark)**

**Question 3** (2 marks)









**(1 mark)** for solutions from first bracket

**(1 mark)** for solutions from second bracket

**Question 4** (2 marks)





**(1 mark)**

So the largest sample size, i.e. the largest value of *n* is 100.

**(1 mark)**

**Question 5** (3 marks)

1. 

Draw a diagram. Note that the shaded area represents  which equals *q.*





**(1 mark)**

1. Method 1 – using the diagram

The sample space is reduced to  i.e. *q*. 



**(1 mark)** for numerator **(1 mark)** for denominator

Method 2 – using the formula

 **(1 mark)**

**(1 mark)**

**Question 6** (6 marks)

1. horizontal asymptote: 

vertical asymptote: 

*y-*intercepts occur when 



*x-*intercepts occur when 

**



**(1 mark)** – correct intercepts **(1 mark)** – correct asymptotes **(1 mark)** – correct shapes

1. 

Let 

Swap *x* and *y* for inverse.



**(1 mark)**

**(1 mark)**

1. Note that *f* and ** are self-inverses so . **(1 mark)**

**Question 7** (5 marks)

1. Set up a table showing the discrete distribution.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| *x* | 0 | 1 | 2 | 3 |
|  | *k* | *k* | 4*k* | 9*k* |

**(1 mark)**



**(1 mark)**

1.  (given)



**(1 mark)**

**(1 mark)**

Method 2 – using the formula

 **(1 mark)**

1. Method 1 – using the table

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| *x* | 0 | 1 | 2 | 3 |
|  |  |  |  |  |



**(1 mark)**

**(1 mark)**

**Question 8** (5 marks)

1. We have .

Let *D* = the distance from *P* to *Q*.



**(1 mark)**

 for min/max.

 (Note, if the denominator equals zero then  is undefined.)

From the graph we see that we must have a minimum rather than a maximum at . **(1 mark)**

Substitute  into



Minimum distance is  units.

**(1 mark)**

1. Let an image point be .









The image equation is



**(1 mark)**

So 

*Q* is the point .

**

So *Q* lies on *h*.

**(1 mark)**

**Question 9** (5 marks)

1. 





as required.

**(1 mark)**

1. 



**(1 mark)**

**(1 mark)**

Note that since *n* is a positive, even integer, 

1. Method 1 – using part **b.**

From part **b**., 

So, 



**(1 mark)**

Required area is  square units.

**(1 mark)**

Method 2 – “otherwise”



From the graph, we see that .



**(1 mark)**

Required area is  square units.

**(1 mark)**

**Question 10** (6 marks)



1. 



**(1 mark)**

**(1 mark)**

1. 

**(1 mark)**

**c.**



From part **a**., when , .

The *y*-coordinate of *Q* is .

The *y*-coordinate of *R* is 



**(1 mark)**





**(1 mark)**

 **(1 mark)**