

**MATHS METHODS 3 & 4**

**TRIAL** **EXAMINATION 1**

**SOLUTIONS**

**2021**

# Question 1 (3 marks)

1. 



**(1 mark)**

1. 



**(1 mark)**

**(1 mark)**

Note that .

**Question 2** (3 marks)

1. 



**b.** Do a quick sketch.



**(1 mark)**

1. Show ****

****

Let 

Swap *x* and *y* for inverse.



**(1 mark) (1 mark)**

**Question 3** (3 marks)

1. Draw a tree diagram.



The probability of throwing a 1, 2, 3, 4 or 5 with the red die is .



**(1 mark)**

**(1 mark)**

1. 



**(1 mark)**

**Question 4** (4 marks)

1. average rate of change

**(1 mark)**



**(1 mark)**

1. The transformation involves a reflection in the *x*-axis.



**(1 mark)** – correct axis intercepts

**(1 mark)** – correct shape

**Question 5** (5 marks)

1. 

**(1 mark)**

1. 





**(1 mark)**

So .

**(1 mark)**

1. approximate confidence interval (formula sheet)

where .



**(1 mark)**





**(1 mark)**

**Question 6** (3 marks)

Do a quick sketch.



From the diagram,



**(1 mark)**

**(1 mark)**

**(1 mark)**

**Question 7** (4 marks)





1. From the graph, the minimum value of **b.**

*f* occurs at the minimum turning point.

This occurs when

**(1 mark)**



**(1 mark)**

**(1 mark)**

The minimum value of *f* is .

**(1 mark)**

**Question 8** (7 marks)

1. The graph of *f* is a semi-circle.





**(1 mark)**

1. *A* is a maximum when .



**(1 mark)**

 when



*P* is in the first quadrant so . **(1 mark)**



*P* is the point  when *A* is a maximum.

**(1 mark)**

1. From part **b**., *A* is a maximum when *P* is 





So angle *PQR* is  when *A* is a maximum.

**(1 mark)**

1. 



The tangent to the graph of *f* that is parallel to the line segment *PQ* when *A* is a maximum occurs when



**(1 mark)**

Point of tangency is .

Equation of tangent is .



 **(1 mark)**

**Question 9** (8 marks)

1. 



So the point  lies on the graph of *g* as required. **(1 mark)**

1. ** (chain rule)

 **(1 mark)**

1. Do a quick sketch, it doesn’t have to be too detailed,



the important thing to note is that for

, i.e. sine and cosine are both

positive in the first quadrant.

Note that *g* passes through the point .

Method 1



**(1 mark)**

From part **b.**, 





**(1 mark)**

**(1 mark)**

Method 2



**(1 mark)**

**(1 mark)**

**(1 mark)**

(\*) From part **b.**,





**d. i.** 

Let 

After a dilation by a factor of *a* from the *y*-axis, replace *x* with .



After a reflection in the *y*-axis, replace *x* with .



**(1 mark)**

* 1. The domain of *g* is .

After the dilation, it becomes .

After the reflection, it becomes .

.

**(1 mark)**

**e.**  from part **d. ii.**



Also  (given in question).

So . **(1 mark)**

(Note this means that the dilation was a ‘compression’ not a ‘stretch’ which makes sense geometrically if .)