 Name: …Solutions…….......……

|  |  |  |
| --- | --- | --- |
| **Resource Free** | **/30** | **%** |
| **Resource Rich** | **/27** | **%** |
| **Total** | **/57** | **%** |

Mathematics Methods, Year 12, 2018

Test 1 – Further differentiation and applications

30 minutes working time.

Calculator Free Section (no notes, no calculators)

SCSA Formula sheet allowed

1. [6 marks: 2, 2, 2]

Determine  for each of the following.

a)

✓ ✓

b)

✓

✓

c)

✓

✓

**2. [3 marks]**

Use and to comment on whether the derivative of the product of two functions is equal to the product of their derivatives.

✓

If ,

If ,

✓

∴ The derivative of the product of two functions does not (necessarily) equal the product of their derivatives. ✓

**3. [3 marks]**

If , show that .

✓

✓

✓

**4. [4 marks]**

Calculate the minimum and maximum values of in the interval .

If , ✓

when or .

So the only TP over the interval is when . ✓

✓

So the minimum value is 5 and the maximum value is 32. ✓

**5. [2 marks]**

A particle leaves the origin when and moves in a straight line with velocity at any time seconds, where , given by

Determine the time when the acceleration of the particle is zero.

✓

⇒ ⇒ s ✓

**6. [5 marks]**

Given that , use and the incremental formula to determine an approximate value for .

, ✓

✓

✓

✓

∴ ✓

**7. [7 marks: 1, 1, 1, 1, 3]**

Given ,

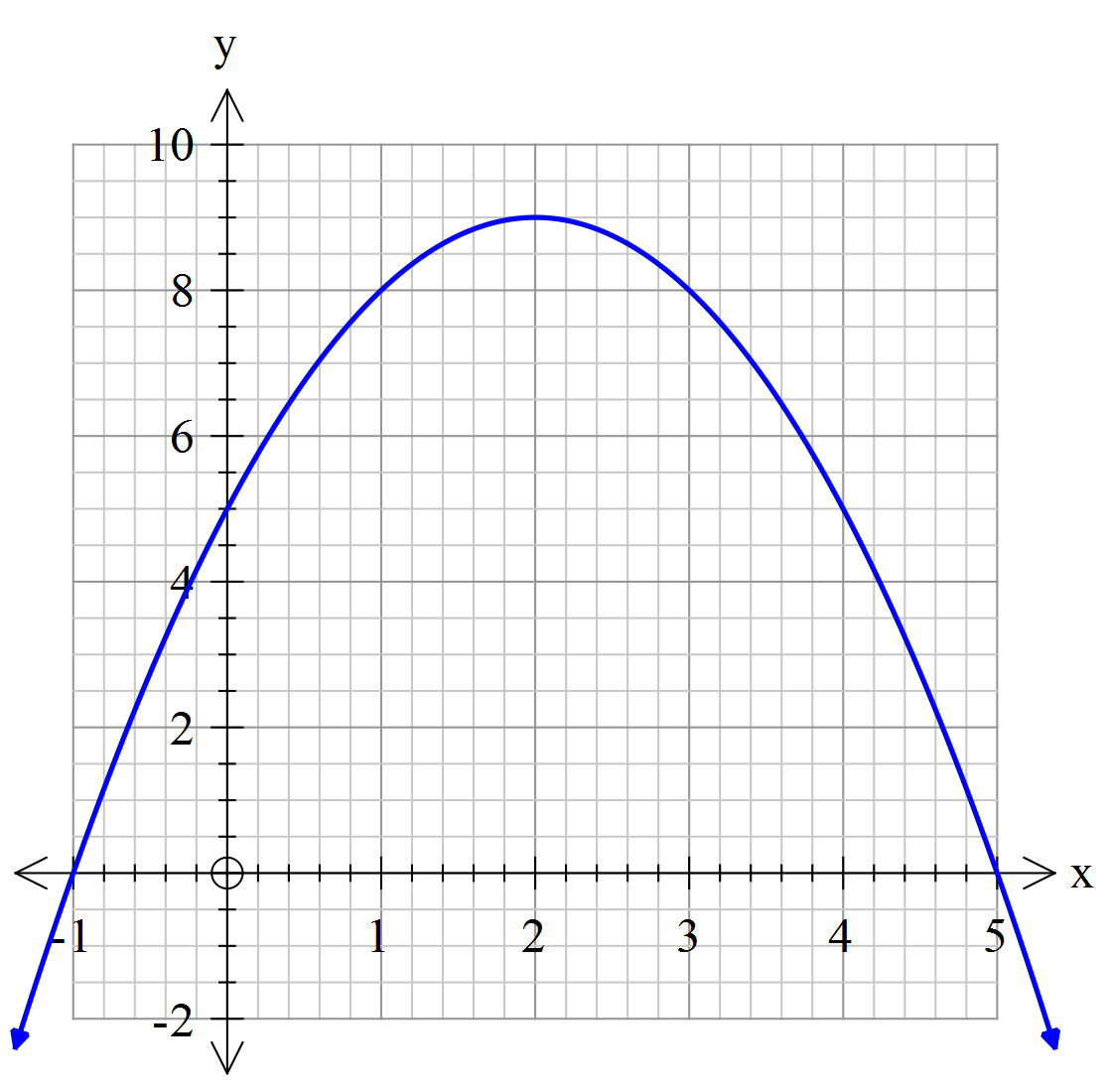
a) Evaluate:

(i) *f* (2) 9 ✓

(ii) *f* ′(2) 0 ✓

(iii) *f* ′′(2) -2 ✓

b) i. Sketch the graph of *f* (*x*) over the domain  on the axes provided.



✓

ii. With reference to your sketch, explain the significance of each answer from part a.

(i) *f* (2) is the *y* value of the turning point. ✓

(ii) *f* ′(2) suggests the function has a stationary point at *x* = 2.

i.e. the gradient of the tangent at (2, 9) is zero. ✓

(iii) *f*  ′′(2) suggests that the function is concave down at *x* = 2. ✓

END OF CALCULATOR FREE SECTION