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| EGC_Black | Student Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  **Eastern Goldfields College**  Mathematics Methods 2018  Assignment Validation Calculator Free |
| Working Time: 20 minutes | Total Marks: 20 marks |

Question 1 (4 marks)

A box contains a total of 500 marker and highlighter pens of various colours, as shown in the table. Some of the marker pens are permanent and the rest are non-permanent.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Colour | | | |
| Type of pen | Black | Yellow | Pink | Green |
| Permanent marker | 55 | 83 | 40 | 24 |
| Non-permanent marker | 45 | 67 | 24 | 12 |
| Highlighter | 0 | 50 | 46 | 54 |

A pen is selected at random from the box. Determine the probability that it is

(a) a green pen. (1 mark)

(b) a marker pen. (1 mark)

(c) a green pen or a marker pen. (1 mark)

(d) a yellow pen, given that it is a highlighter. (1 mark)

Question 2 (6 marks)

(a) Determine when . (2 marks)

(b) Simplify

(i) . (1 mark)

(ii) . (1 mark)

(c) Calculate the gradient of the curve where . (2 marks)

Question 3 (8 marks)

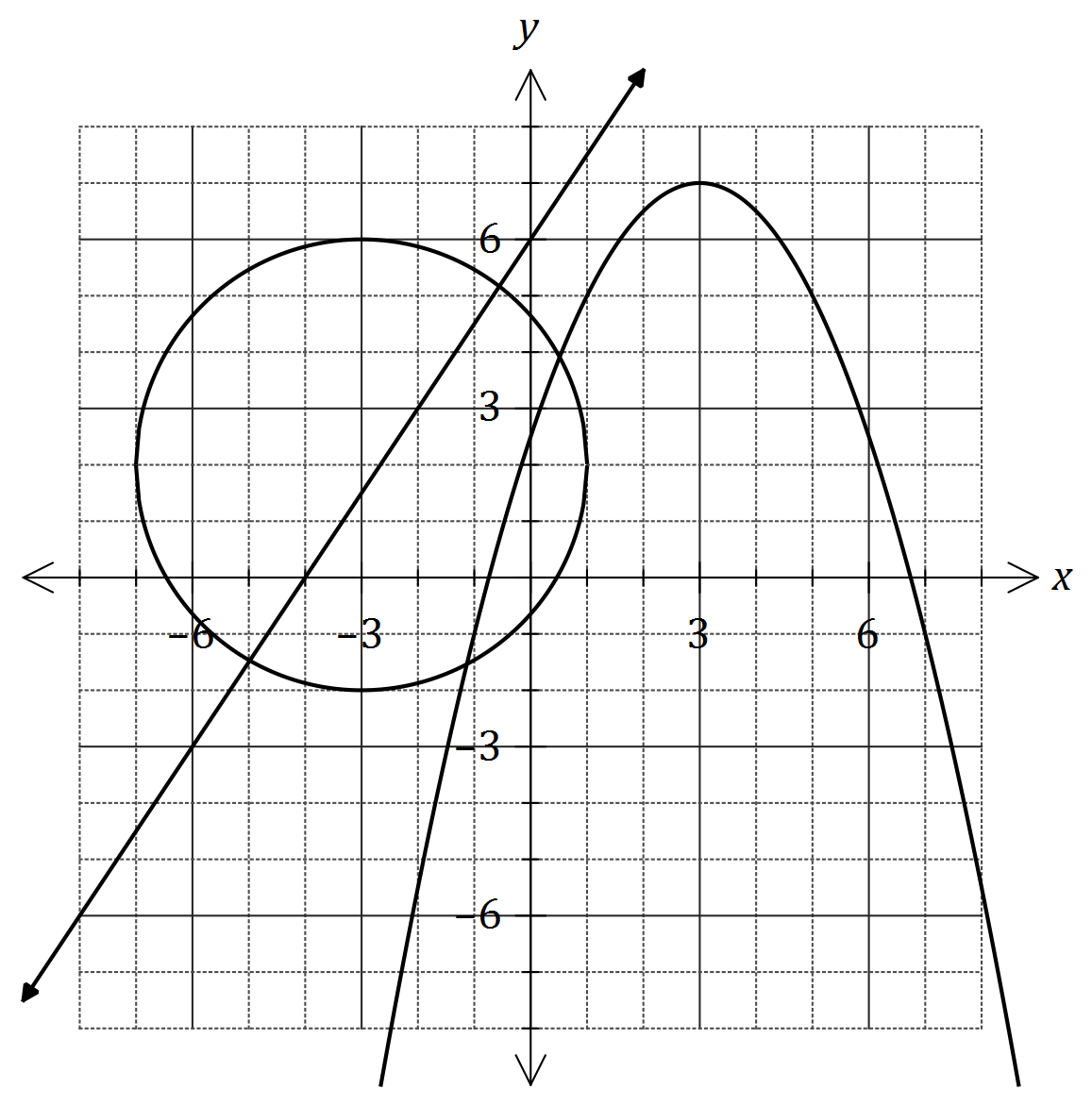
(a) The equations and both have as a solution. Determine the values of and . (4 marks)

(b) The equation also has as a solution. Determine all other solutions to the equation. (4 marks)

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| EGC_Black | Student Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  **Eastern Goldfields College**  Mathematics Methods 2018  Assignment Validation Calculator Assumed |
| Working Time: 30 minutes | Total Marks: 28 marks |

Question 4 (10 marks)

The graph of two functions and a circle of radius 3 units are shown.



(a) One function is . Determine the values of the constants and . (2 marks)

(b) The relation can be written in the form .

Determine the values of the constants and . (3 marks)

(c) The other function is .

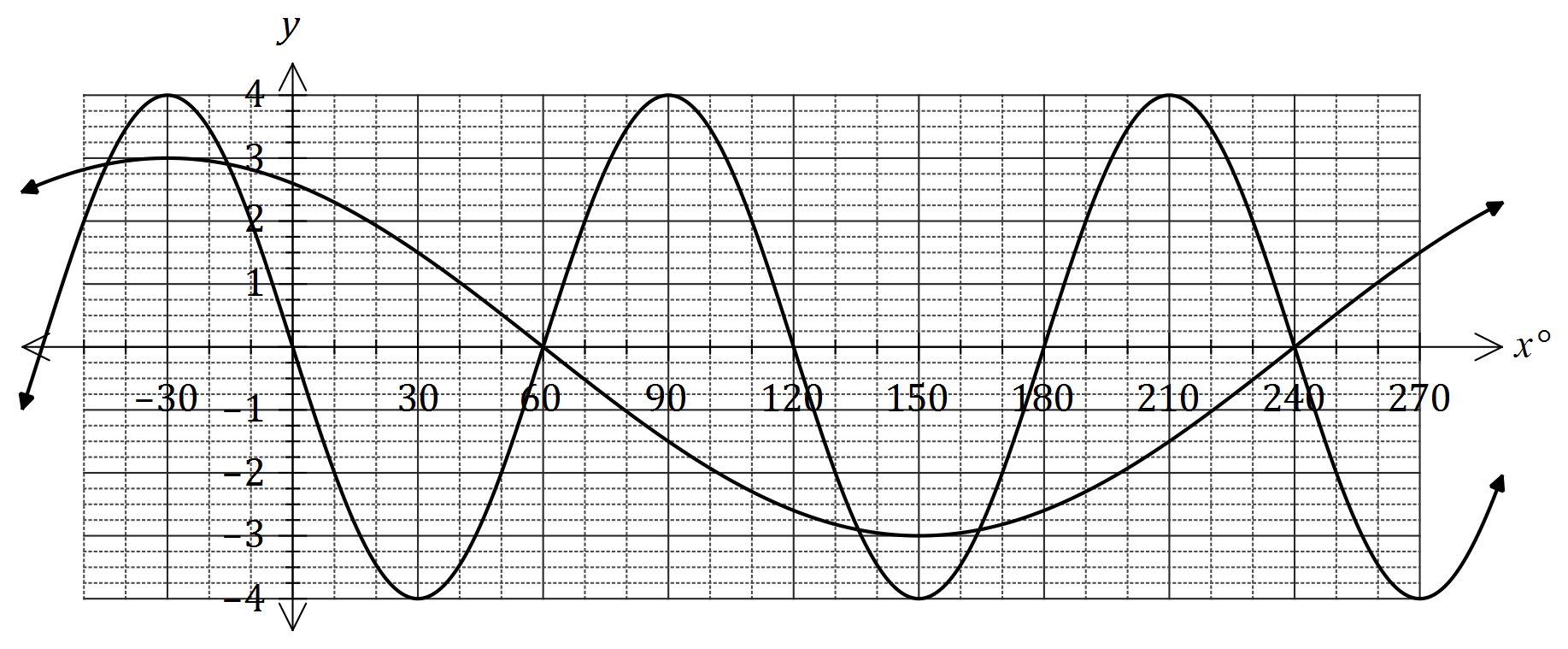
(i) Determine the values of the constants and , given that has a maximum at . (3 marks)

(ii) State coordinates of the turning point of the graph of . (1 mark)

(iii) State the range of the function . (1 mark)

Question 5 (10 marks)

(a) The graphs of and , where is in degrees, are shown below.



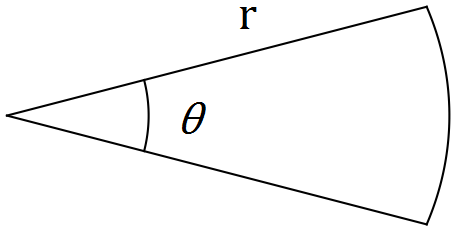
(i) Determine the values of the constants and . (4 marks)

(ii) Use the graph to solve . (2 marks)

(b) and are acute angles with and . Determine the **exact** value of . (4 marks)

Question 6 (8 marks)

The perimeter of a sector of a circle, of radius cm and central angle radians, is 120 cm.



(a) Show that . (2 marks)

(b) Show that the area of the sector is given by . (2 marks)

(c) Use calculus to determine the maximum area of the sector and state the values of and that achieve this maximum. (4 marks)