SHENTON COLLEGE

ATMAM Mathematics Methods

Test 2 (2018) Calculator Assumed

Name: ……

Teacher: Friday Smith

Time Allowed : 20 minutes

Marks /23

Materials allowed: Classpad, Formula Sheet.

All necessary working and reasoning must be shown for full marks.
Where appropriate, answers should be given to <u>two</u> decimal places.
Marks may not be awarded for untidy or poorly arranged work.

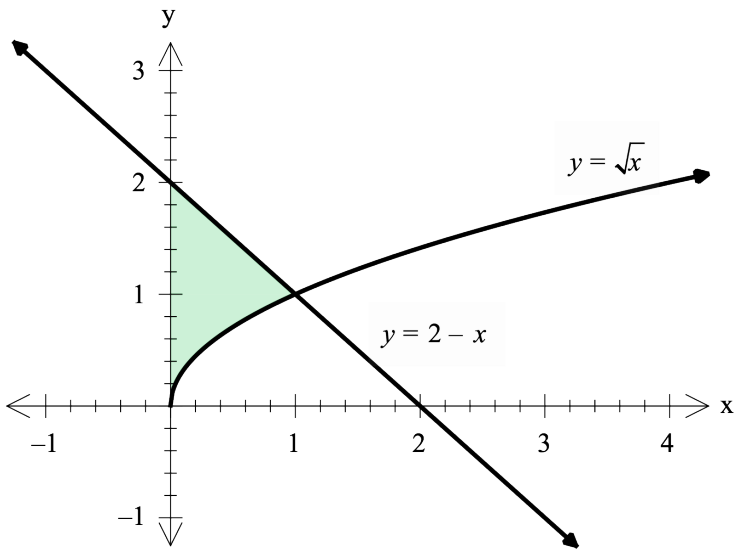
1 Given $\int_{-4}^{3} f(x)dx = 7$ and $\int_{1}^{3} f(x)\,dx = -4$, determine

a) $\int_{-4}^{1} f(x)dx$ (1)

b) $\int_{1}^{1} f(x)dx$ (1)

c) $\int_{1}^{3} 2f(x) + 1\,dx$ (2)

2 Determine the area of the shaded region, clearly showing how you obtained your answer. (3)



3 The Neinz Quality Food Company are redesigning their can for their iconic pickled eel and ox tongue soup. The can is to be cylindrical and have a volume of 300mL.

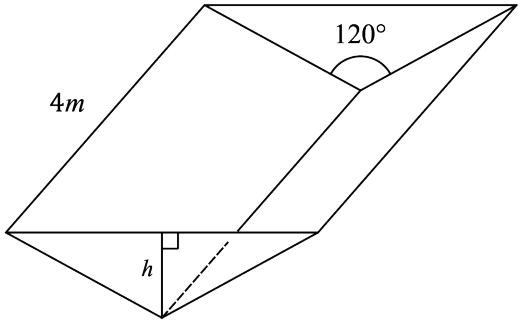
a) Rearrange the volume formula to determine an equation for the height of the can in terms of the radius. (1)

b) Write an expression for the surface area of the can in terms of the radius, simplifying where appropriate. (2)

c) The material for the sides of the can is relatively thin and costs $0.02c/cm^2$. The material for the top and bottom of the can is much thicker and costs $0.06c/cm^2$. Write an expression for the total material cost for the can, in terms of the radius only. (1)

d) Use your answer for part c) to determine the dimensions of the can which minimise the material cost. Determine this minimum cost. (5)

4 A steel trough in the shape of an isosceles prism is slowly being filled with water.



a) Show that the volume of water in the trough (in m^3) given by the equation $V = 4\sqrt{3}h^2$, where h is the height of the water. (2)

b) Use the method of small change to find the change in the height of the water if the volume is increased from 0.8 m^3 to 0.81 m^3. Give your answer in millimetres, to two decimal places. (5)