SHENTON COLLEGE

Year 12 Mathematics Methods (ATMAM)

Test 2 2017

Calculator Free

Time Allowed: 25 minutes

Marks / **27**

Name: ……

Circle Your Teachers Name: Mrs Friday Mr Smith

Question 1 [3,3,2]

Determine the following:

(a) $\int (4x^3 + 2\sqrt[3]{x} - \frac{4}{x^3})dx$

(b) $\int (\frac{e^{2x}+e^{-3x}}{e^x})dx$

(c) $\int 2sin3x + \cos(4x + \pi)dx$

Question 2 [3,3]

Evaluate

(a) $\int_2^6 \frac{1}{\sqrt{2x-3}}dx$

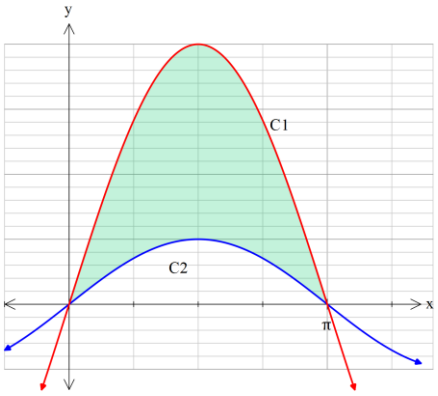
(b) $\int_0^{\frac{\pi}{3}} (cos3\theta + sin3\theta)d\theta$

Question 3 [1,3]

The illustrated curves are the graphs of

$$y = sinx \; and \; y = 4sinx.$$

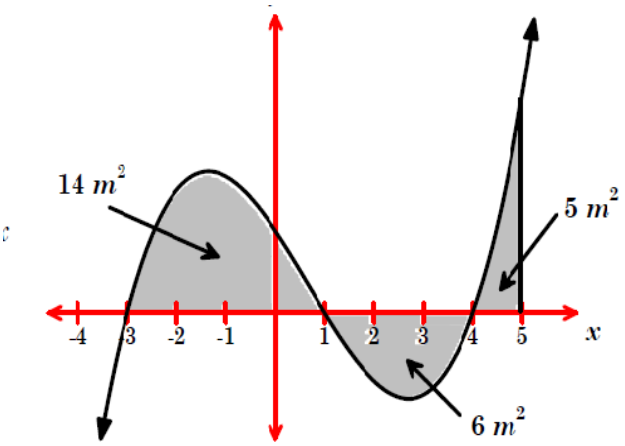
(a) Identify each curve



(b) Determine the shaded area.

Question 4 [1,1,2]

For the graph of y = h(x) to the right the areas between the curve and the x-axis are shown.



Use this to state the value of the following integrals.

(a) $\int_{-3}^{5} h(x)dx$

(b) $\int_{5}^{4} h(x)dx$

(c) $\int_{-3}^{1} [h(x) + 2]dx$

Question 5 [5]

The function $y = f(x)$ passes through the point (0,-1). A tangent to $f(x)$ has a gradient of 3 at that point. $f''(x) = 80(2x - 1)^3$. Determine the function $f(x)$.

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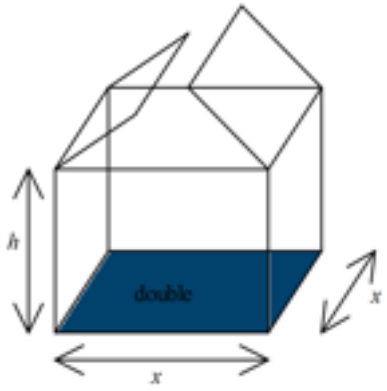
Question 6 [1,2,3,1]

A manufacturer produces cardboard boxes that have a square base. The top of each box consists of a double flap that opens as shown. The base of the box has a double layer of cardboard for strength. Each box must have a volume of 12 cubic metres.



(a) Show that the area of cardboard required is given by $C = 3x^2 + 4xh$

(b) Express C as a function of x only.

(c) Use calculus to determine what dimensions will minimise the amount of cardboard used.

(d) What is the minimum area of cardboard used?

Question 7 [4]

Use calculus to estimate the percentage change in y for y = $2x^3$ when x decreases by 2%

Question 8 [1,2,3]

The cost of producing x items of a product is given by \$$[5x + 2000e^{-0.01x}]$. Each item is sold for \$24.90.

(a) Write an equation to describe $R(x)$, the revenue from selling the product .

(b) Write an equation for $P(x)$, the profit function.

(c) Demonstrate the use of calculus to find the profit associated with the sale of the 501st item at the point in production where 500 items are produced.

Question 9 [2,1]

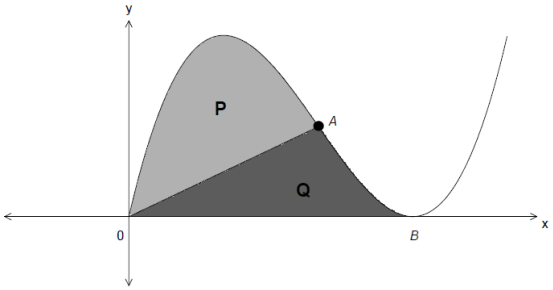
Consider the function $f(x) = (x-4)(x+1)(2x+7)$

(a) Write down a sum of integrals which when evaluated could be used to determine the area trapped by $f(x)$ and the $x-axis$.

(b) Calculate the area.

Question 10 [2,3,2]

The diagram below shows part of the curve $y = x(x-3)^2$, which passes through the point of inflection at A and touches the x-axis at B.



(a) Locate the coordinates of the points A and B.

(b) Find area of the region labelled P. Indicate the integral you used.

(c) Find the area of the region labelled Q.

End of test