2020 YEAR 12 MATHEMATICS: METHODS
Test 2 (Integration)

SHENTON COLLEGE

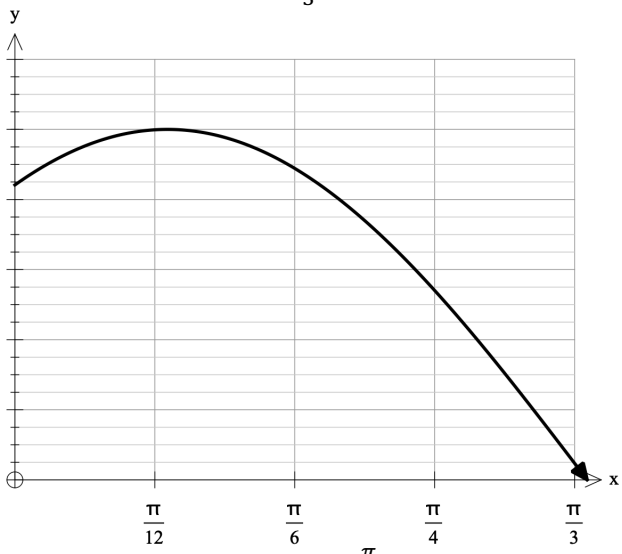
NAME:_____

TEACHER:	AI	FRIDAY	WHITE
Calculator-Assumed	Formula sheet provided	Working time: 30 minutes	Marks: ___ 23

QUESTION 4

[8 marks – 3, 2, 1, 2]

a) Estimate the area under the curve of $y = \sin(2x + 1)$ over the domain $0 \leq x \leq \frac{\pi}{3}$ using left rectangular strips of width $\frac{\pi}{12}$.



b) Estimate the area under the curve of $y = y = \sin(2x + 1)$ over the domain $0 \leq x \leq \frac{\pi}{3}$ using right rectangular strips of width $\frac{\pi}{12}$.

c) Use your answers from part a) to b) to calculate an average estimated area.

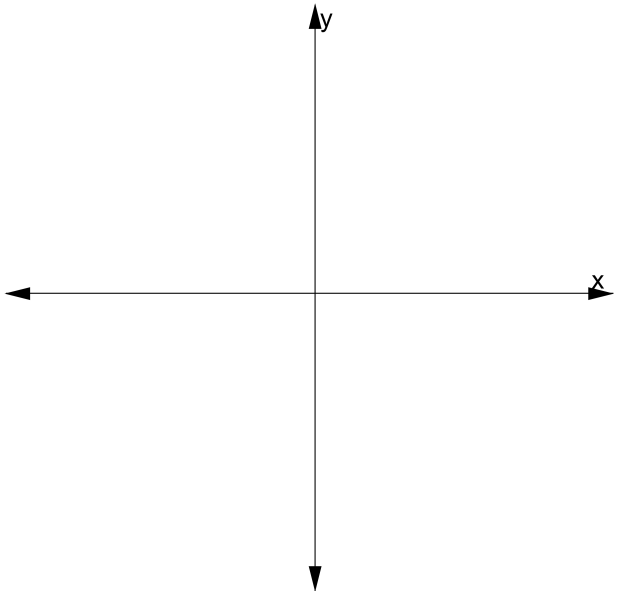
d) Evaluate the actual area under the curve. Suggest one way that you could modify the process you completed from parts a) to c) so that your estimation is closer to this result.

QUESTION 5

[5 marks – 2, 3]

Consider the cubic function $y = -x^3 + 2x^2 + 8x$.

a) Determine the roots of the function and hence draw a sketch of the cubic on the axes provided, with its roots clearly labelled.
Note: you do not need to determine any other key features of the graph.



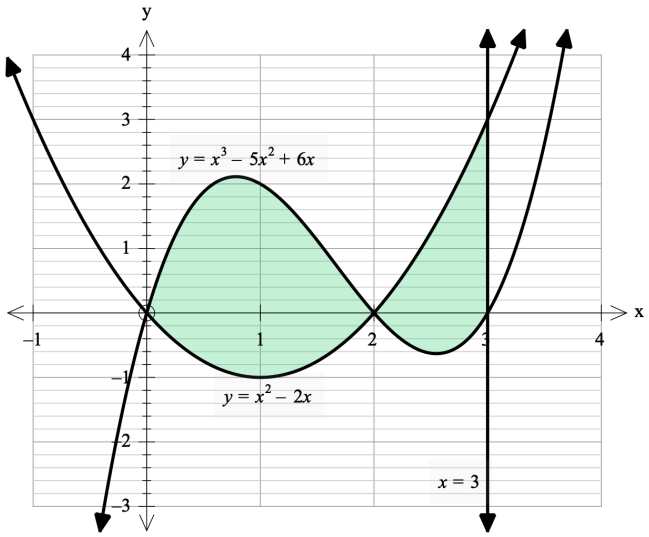
b) Show the use calculus to determine the exact area bound by the curve and the x-axis.

QUESTION 6

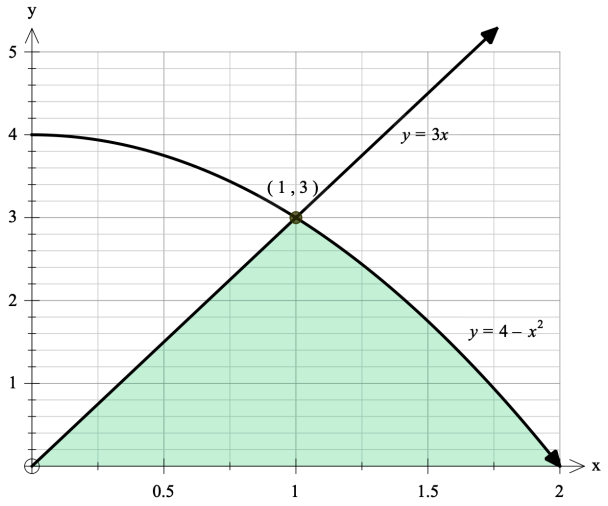
[6 marks – 2, 2, 2]

Show how you would use integrals to calculate the following shaded areas.
Note: You do not need to evaluate the areas.

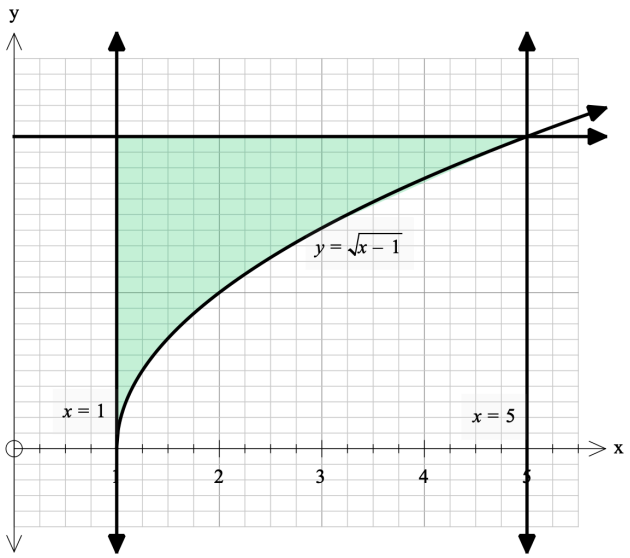
a)



b)



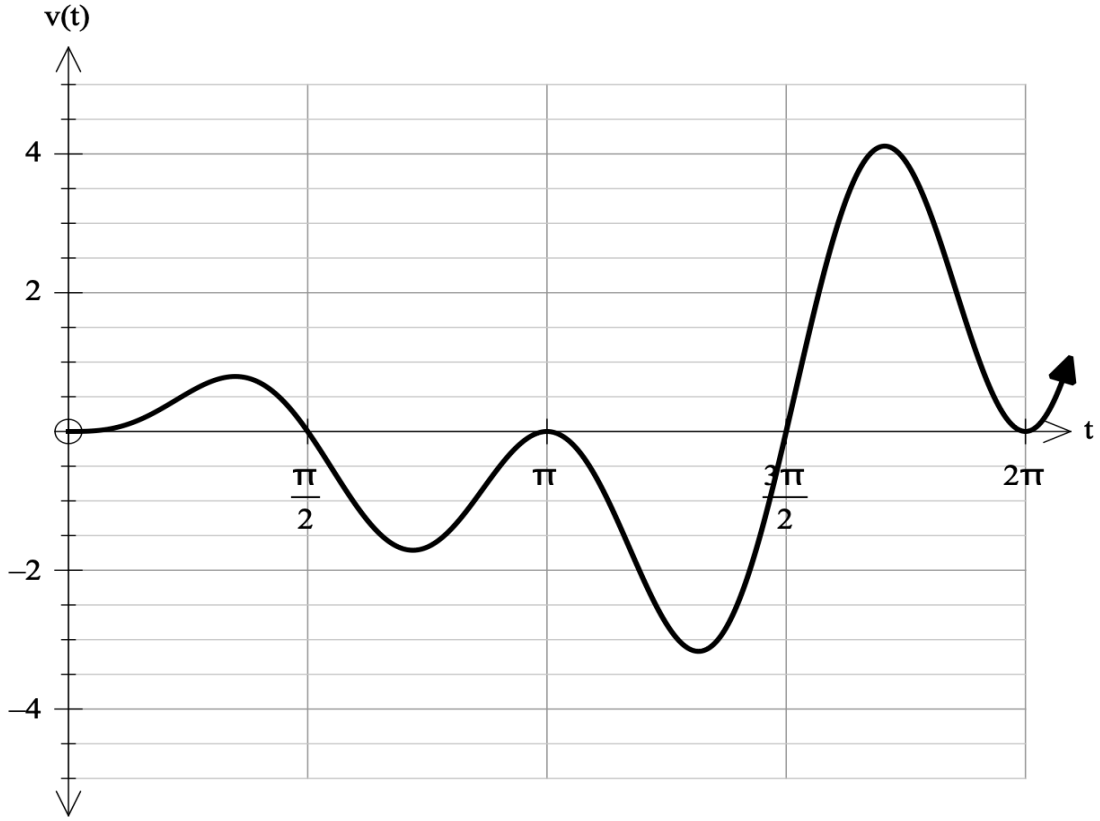
c)



QUESTION 7

[4 marks – 1, 1, 2]

The graph of $v(t) = 2x \sin^2 x \cos x$ as shown below displays the velocity of a body moving in rectilinear motion, in metres per second, for $0 \leq t \leq 2\pi$ seconds.



a) Explain the significance of the value of $\int_0^{\frac{3\pi}{2}} v(t)\ dt$ in relation to the body's movement.

b) Explain the significance of the value of $\int_0^{\frac{\pi}{2}} v(t)\ dt - \int_{\frac{\pi}{2}}^{\pi} v(t)\ dt$ in relation to the body's movement.

c) Calculate the total distance travelled between π seconds and 2π seconds.

End of Calculator Assumed Section