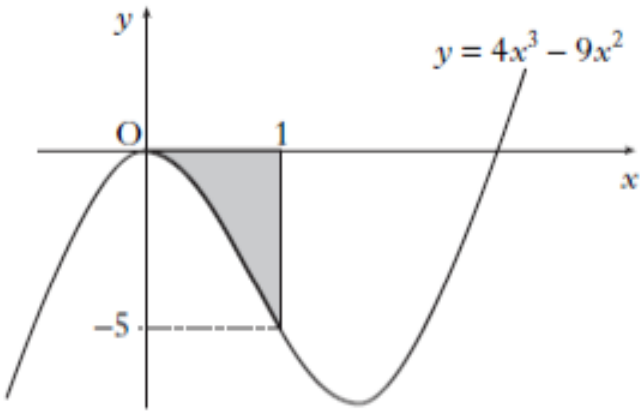
Please attempt the following questions in preparation for the online session on 1st March 2018.

Q1
Find $\int 4\sqrt{x}+\frac{1}{x^3}dx$, where $x > 0$.

Q2
The rate of change of the temperature,
T ˚C of a cup of tea is given by $\frac{dT}{dt}=\frac{1}{25}t-k \quad , 0 \le t \le 50$
t is the elapsed time in minutes after the tea is poured
k is a constant
Initially the temperature of the tea is 100˚C
10 minutes later the temperature has fallen to 82˚C
Express T in terms of t.

Q3
Find $\int 8\cos(4x+1)dx.$

Q4
The graph of $y = 4x^3 – 9x^2$ is shown in the diagram.



Calculate the shaded area.

Q5

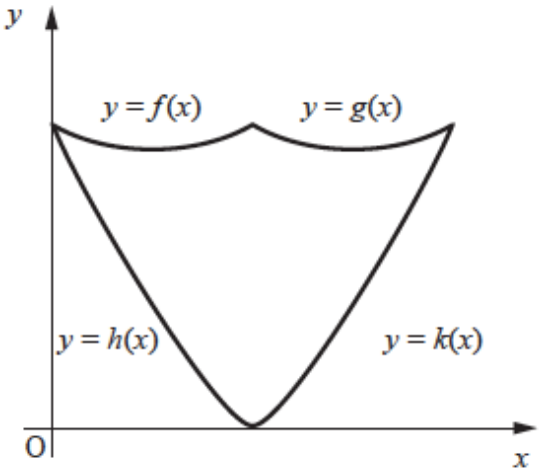
A badge has been modelled by parts of the graphs of 4 quadratic functions as shown in the diagram.

$f(x) = \frac{1}{4}x^2 - \frac{1}{2}x + 3$

$g(x) = \frac{1}{4}x^2 - \frac{3}{2}x + 5$

$h(x) = \frac{3}{8}x^2 - \frac{9}{4}x + 3$

$k(x) = \frac{3}{8}x^2 - \frac{3}{4}x$



(a) Find the x-coordinate of the point of intersection of $f(x)$ and $g(x)$.

The graphs of $f(x)$ and $h(x)$ intersect on the y-axis.
The badge has a vertical line of symmetry.

(b) Calculate the area of the badge.