Integration (Math AI SL)

1. A function is defined as $f(x) = 9x^2 + 4x + 2$. The function $g(x)$ is found by integrating $f(x)$.

   a) Write the expression for finding $g(x)$.
   b) Evaluate your expression, given that $g(x)$ intersects the y axis at (0, 5).

2. The velocity of an object, in ms^{-1}, is given by $\frac{dy}{dt} = 2t^2 + 5t + 8.$, where t is time in seconds.

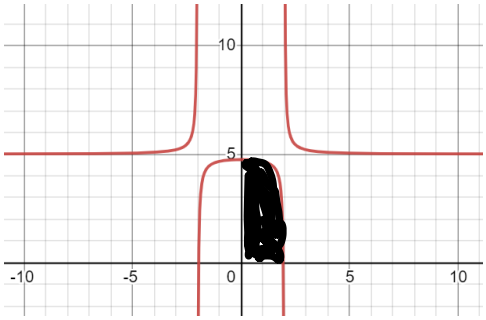
   a) The formula for the distance travelled, $s(t)$, can be found by integrating the velocity function. Hence, write an expression for $s(t)$
   b) Evaluate your expression, given that the distance of the object after 5 seconds is 3 m from the starting position.

3. Given that $f'(x) = 12x^2 + 2x - 3$ and $f(2) = 8$, find $f(x)$.

4. The marginal cost, in USD, for a company is given by $C'(x) = 4x^2 + 2x - 3$, where x is the number of units made. Given that the costs associated for producing 5 units is 50 USD, determine the cost function.

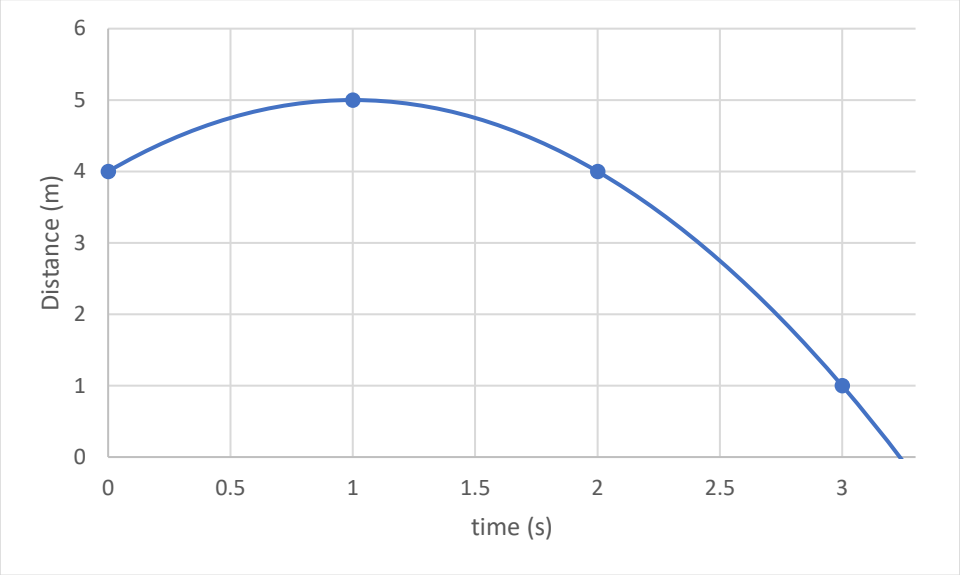
5. For the function:

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



a) Find the value of the x intercepts.
b) State the equations of the 3 asymptotes.
c) Write an expression for determining the area, a, of the shaded region.
d) Calculate the area, a.
e) Hence, determine the total area enclosed between the x-intercepts, x-axis, and the function $f(x)$

6. The trajectory of an object is described by the function, given as $s(t) = at^2 + bt + \mathbf{c}$



a) Create a system of three equations in the form $s(t) = at^2 + bt + c$ using points from the graph.
b) Solve your system of equations and state the value of a, b and c.
c) Determine how much time has elapsed when the object hits the ground.
d) Write an expression for the area under the curve during which the object is in the air.
e) Evaluate your expression.