13A Introduction to Integration

1. Integrate the following:

   a) $\frac{dy}{dx} = x^4$

   b) $\frac{dy}{dx} = x^{-5}$

   c) $\frac{dy}{dx} = 6x + 2x^{-3} - 3x^{\frac{1}{2}}$

2. Find:

$$\int (x^{\frac{1}{2}} + 2x^3)dx$$

3. Find:

$$\int (4t^2 + 5)dt$$

4. Find:

$$\int (3x^2 + px^{-2} + q^2)\,dx$$

5. Find:

$$\int \left(4x^2 + \frac{\sqrt{x} + 5}{x^2}\right) dx$$

13C Finding C

1. The curve X with equation y = f(x) passes through the point (2,15). Given that:

$$f(x) = 5x^2 + 3x$$

Find the equation of X.

1. The curve X with equation y = f(x) passes through the point (4,5). Given that:

$$f'(x) = \frac{x^2 - 2}{\sqrt{x}}$$

Find the equation of X.

13D Definite Integrals

1. *Find:* $\int_1^2 3x^2 \ dx$

2. *Evaluate:* $\int_0^1 \left(x^{\frac{1}{3}} - 1\right)^2 dx$

3. Given that P is a constant and $\int_1^5 (2Px + 7)\, dx = 4P^2$, show that there are two possible values for P, and find what they are.

13E Finding Areas

1. Find the area of the finite region between the curve with equation $y = 20 - x - x^2$ and the x-axis.

13F Finding Areas Under the X-Axis

1. Find the area of the finite region bounded by the curve $y = x(x - 3)$ and the x axis.

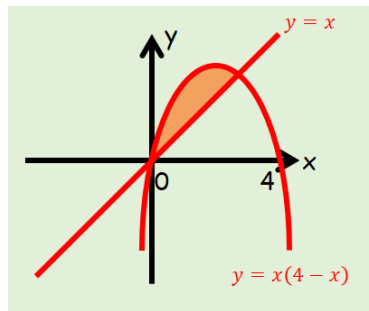2. a) Sketch the curve with equation:
$$y = x(x - 1)(x + 3)$$

b) Find the area of the finite region bounded by the curve and the x-axis

13G Finding Areas Between Curves

Option 1:

Option 2:

1.

The diagram shows a sketch of part of the curve with equation:

$$y = x(4 - x)$$

and the line:

$$y = x$$

Find the area of the region bounded by the curve and the line.

2. The diagram below shows a sketch of part of the curve with equation:
$$y = x(x - 3)$$
and the line:
$$y = 2x$$
Find the area of the shaded region OAC.