

# All integration Part 1

## Q1

(a) Find

$$\int xe^x dx \quad [5]$$

(b) (i) Write

$$\frac{11-4x}{(x-2)(2x-1)}$$

in partial fractions.

[5]

(ii) Hence find

$$\int \frac{11-4x}{(x-2)(2x-1)} dx \quad [4]$$

## Q2

Use the substitution  $u = x - 4$  to find

$$\int 5x(x - 4)^3 dx \quad [6]$$

Find the **exact** value of

$$\int_1^2 x^2 \ln x dx \quad [7]$$

### Q3

(i) Write  $\frac{3x + 4}{x(x + 1)}$  in partial fractions.

[6]

(ii) Hence find the exact area bounded by the curve  $y = \frac{3x + 4}{x(x + 1)}$ , the  $x$ -axis and the lines  $x = 2$  and  $x = 3$   
[The curve does not cross the  $x$ -axis between 2 and 3]

[7]

## Q4

Find

$$\int x \operatorname{cosec}^2 x \, dx$$

[7]

## Q5

(a) Find  $\int 2x^4 \ln 3x \, dx$  [6]

(b) Use partial fractions to find

$$\int \frac{x+9}{3-2x-x^2} \, dx$$
 [8]

## Q6

A wooden plinth for a statue can be modelled by the volume generated when the area bounded by the curve  $y = \sec x$ , the  $x$ -axis, the  $y$ -axis and the line  $x = a$   $\left(0 < a < \frac{\pi}{2}\right)$  is rotated through  $2\pi$  radians about the  $x$ -axis.

(a) Find an expression for  $V$ , the volume of the plinth. [5]

(b) Find  $V$  if  $a = \frac{\pi}{4}$  [1]

## Q7

Find

(i)  $\int_0^2 xe^{-x} dx$  [7]

(ii)  $\int \sin^3 x dx$  [7]