

Jan  
2020



5. (a) Find  $\int \frac{9x+6}{x} dx$ ,  $x > 0$ .

(2)

(b) Given that  $y = 8$  at  $x = 1$ , solve the differential equation

$$\frac{dy}{dx} = \frac{(9x+6)y^{\frac{1}{3}}}{x}$$

giving your answer in the form  $y^2 = g(x)$ .

(6)

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3. (a) Express  $\frac{5}{(x-1)(3x+2)}$  in partial fractions.

(3)

(b) Hence find  $\int \frac{5}{(x-1)(3x+2)} dx$ , where  $x > 1$ .

(3)

(c) Find the particular solution of the differential equation

$$(x-1)(3x+2) \frac{dy}{dx} = 5y, \quad x > 1,$$

for which  $y = 8$  at  $x = 2$ . Give your answer in the form  $y = f(x)$ .

(6)

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7. (a) Express  $\frac{2}{4-y^2}$  in partial fractions.

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(3)

(b) Hence obtain the solution of

$$2 \cot x \frac{dy}{dx} = (4 - y^2)$$

for which  $y = 0$  at  $x = \frac{\pi}{3}$ , giving your answer in the form  $\sec^2 x = g(y)$ .

(8)

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