Edexcel (U.K.) Pre 2017

Questions By Topic

FP2 Chap04 First Order Differential Equations

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3. Find the general solution of the differential equation

$$x\frac{\mathrm{d}y}{\mathrm{d}x} + 5y = \frac{\ln x}{x}, \qquad x > 0$$

giving your answer in the form $y = \mathrm{f}(x)$.

(8)

Leave blank

3. Find the general solution of the differential equation

$$\sin x \frac{\mathrm{d}y}{\mathrm{d}x} - y\cos x = \sin 2x \sin x,$$

giving your answer in the form $y = \mathrm{f}(x)$.

(8)

Leave blank

5. (a) Find, in the form $y = f(x)$, the general solution of the equation

$$\frac{dy}{dx} + 2y \tan x = \sin 2x, \qquad 0 < x < \frac{\pi}{2}$$

(6)

Given that $y = 2$ at $x = \frac{\pi}{3}$

(b) find the value of y at $x = \frac{\pi}{6}$, giving your answer in the form $a + k \ln b$, where a and b are integers and k is rational.

(4)

Leave blank

7. (a) Show that the substitution $y = vx$ transforms the differential equation

$$3xy^2 \frac{\mathrm{d}y}{\mathrm{d}x} = x^3 + y^3 \qquad \text{(I)}$$

into the differential equation

$$3v^2 x \frac{\mathrm{d}v}{\mathrm{d}x} = 1 - 2v^3 \qquad \text{(II)}$$

(3)

(b) By solving differential equation (II), find a general solution of differential equation (I) in the form $y = \mathrm{f}(x)$.

(6)

Given that $y = 2$ at $x = 1$,

(c) find the value of $\frac{\mathrm{d}y}{\mathrm{d}x}$ at $x = 1$

(2)

Leave blank

5. (a) Find the general solution of the differential equation

$$x\frac{dy}{dx} + 2y = 4x^2$$

(5)

(b) Find the particular solution for which $y = 5$ at $x = 1$, giving your answer in the form $y = f(x)$.

(2)

(c) (i) Find the exact values of the coordinates of the turning points of the curve with equation $y = f(x)$, making your method clear.

(ii) Sketch the curve with equation $y = f(x)$, showing the coordinates of the turning points.

(5)

Leave blank

7. (a) Show that the transformation $z = y^{\frac{1}{2}}$ transforms the differential equation

$$\frac{dy}{dx} - 4y\tan x = 2y^{\frac{1}{2}} \qquad \text{(I)}$$

into the differential equation

$$\frac{dz}{dx} - 2z\tan x = 1 \qquad \text{(II)}$$

(5)

(b) Solve the differential equation (II) to find z as a function of x.

(6)

(c) Hence obtain the general solution of the differential equation (I).

(1)