EXERCISE 22.6

Question. 1

Solution:

From the question it is given that,

$(dy/dx) + ((1 + y^2)/y) = 0$

Transposing we get,

$dy/dx = - (1 + y^2)/y$

By cross multiplication,

$(y/(1 + y^2))\ dy = - dx$

Integrating on both side, we get,

$\int(y/(1 + y^2))\ dy = \int -dx$

$\int(2y/(1 + y^2))\ dy = -2 \int dx$

$\log (1 + y^2) = - 2x + c_1$

Therefore, $½\log [1 + y^2] + x = c$

Question. 2

Solution:

From the question it is given that,

$(dy/dx) = ((1 + y^2)/y^3)$

By cross multiplication,

$(y^3/(1 + y^2))\ dy = dx$

Integrating on both side, we get,

$\int(y - (y/(1 + y^2))\ dy = \int dx$

$\int ydy – \int(y/(1 + y^2))\ dy = \int dx$

$\int ydy – ½ \int(2y/(1 + y^2))\ dy = \int dx$

$(y^2/2) – ½ \log [y^2 + 1] = x + c$

Question. 3

Solution:

From the question it is given that,

$(dy/dx) = \sin^2 y$

By cross multiplication,

$dy/\sin^2 y = dx$

We know that, $(1/\sin x) = \text{cosec } x$

$\text{cosec}^2 y\ dy = dx$

Integrating on both side, we get,

$\int \text{cosec}^2 y\, dy = \int dx + c$
$-\cot y = x + c$

Question. 4
Solution:
From the question it is given that,
$(dy/dx) = (1 - \cos 2y)/(1 + \cos 2y)$
We know that, $1 - \cos 2y = 2 \sin^2 y$ and $1 + \cos 2y = 2 \cos^2 y$
So, $dy/dx = (2 \sin^2 y)/(2 \cos^2 y)$
Also we know that, $\sin \theta/\cos \theta = \tan \theta$
By cross multiplication,
$dy/\tan^2 y = dx$
Integrating on both side, we get,
$\int \cot^2 y\, dy = \int dx$
$\int (\text{cosec}^2 y - 1)\, dy = \int dx$
$-\cot y - y + c = x$
$c = x + y + \cot y$