

## EXERCISE 22.5

### Question. 1

#### Solution:

From the question it is given that,

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

Integrating on both side, we get,

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

We know that  $\int x^n dx = x^{(n+1)}/(n+1)$

$$y = (x^3/3) + (x^2/2) - \log x + c$$

### Question. 2

#### Solution:

From the question it is given that,

$$dy/dx = x^5 + x^2 - (2/x)$$

Integrating on both side, we get,

$$\int dy = \int (x^5 + x^2 - (2/x)) dx$$

We know that  $\int x^n dx = x^{(n+1)}/(n+1)$

$$y = (x^6/6) + (x^3/3) - 2 \log x + c$$

### Question. 3

#### Solution:

From the question it is given that,

$$dy/dx + 2x = e^{3x}$$

Transposing we get,

$$dy/dx = e^{3x} - 2x$$

Integrating on both side, we get,

$$\int dy = \int (e^{3x} - 2x) dx$$

We know that  $\int x^n dx = x^{(n+1)}/(n+1)$

$$y = (e^{3x}/3) - (2x^2/2) + c$$

$$y = (e^{3x}/3) - x^2 + c$$

$$\text{Therefore, } y + x^2 = 1/3 (e^{3x}) + c$$

### Question. 4

#### Solution:

From the question it is given that,

$$(x^2 + 1)dy/dx = 1$$

By cross multiplication,

$$dy = dx/(x^2 + 1)$$

Integrating on both side, we get,

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

We know that  $\int dx/(x^2 + 1) = \tan^{-1} x + c$

Therefore,  $y = \tan^{-1} x + c$

### Question. 5

**Solution:**

From the question it is given that,

$$dy/dx = (1 - \cos x)/(1 + \cos x)$$

We know that  $(1 - \cos x) = 2 \sin^2 (x/2)$  and  $(1 + \cos x) = 2 \cos^2 (x/2)$

So,

$$dy/dx = (2 \sin^2 (x/2))/(2 \cos^2 (x/2))$$

Also we know that  $\sin \theta / \cos \theta = \tan \theta$

$$dy/dx = \tan^2 (x/2)$$

By cross multiplication,

$$dy = \tan^2 (x/2) dx$$

Integrating on both side, we get,

$$\int dy = \int \tan^2 (x/2) dx$$

We know that,  $\sec^2 x - 1 = \tan^2 x$

$$\int dy = \int \sec^2 (x/2) - 1 dx$$

$$y = 2 \tan (x/2) - x + c$$

Therefore,  $y = 2 \tan (x/2) - x + c$

### Question. 6

**Solution:**

From the question it is given that,

$$(x + 2)dy/dx = x^2 + 3x + 7$$

By cross multiplication,

$$dy = [(x^2 + 3x + 7)/(x + 2)] dx$$

On dividing we get,

$$dy = [x + 1 + (5/(x + 2))] dx$$

Integrating on both side, we get,

$$\int dy = \int [x + 1 + (5/(x + 2))] dx$$

Therefore,  $y = (x^2/2) + x + 5 \log (x + 2) + c$