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 $\int x^n dx = x^{(n + 1)}/(n + 1)$
$y = (e^{3x}/3) – (2x^2/2) + c$
$y = (e^{3x}/3) – x^2 + c$
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, $y = (x^2/2) + x + 5 \log (x + 2) + c$