Answers :

(1) (a) $\int (2x+1)(x-1)dx = \int (2x^2 - 2x + x - 1)dx$
$$= \int (2x^2 - x - 1)dx$$
$$= \frac{2x^3}{3} - \frac{x^2}{2} - x + c$$

(b) $\int \frac{\sqrt{x}+1}{\sqrt{x}}dx = \int \left(1 + x^{-\frac{1}{2}}\right)dx$
$$= x + \frac{x^{-\frac{1}{2}+1}}{-\frac{1}{2}+1} + c$$
$$= x + 2\sqrt{x} + c$$

(c) $\int (\frac{x^2+2}{x})^2 dx = \int \frac{x^4 + 4x^2 + 4}{x^2}dx$
$$= \int (x^2 + 4 + 4x^{-2})dx$$
$$= \frac{x^3}{3} + 4x + \frac{4x^{-1}}{-1} + c$$
$$= \frac{x^3}{3} + 4x - \frac{4}{x} + c$$

(2) $\frac{dy}{dx} = 3x^2 + 2$

$$y = \int (3x^2 + 2)dx$$
$$= \frac{3x^3}{3} + 2x + c$$
$$= x^3 + 2x + c$$

Substituting (1, 4) into equation,
$4 = 1^2 + 2(1) + c$
$c = 1$
$\therefore \quad y = x^3 + 2x + 1$