Find the general antiderivative.

1. $\int \left(6t^3 - 7t^2 - \frac{1}{t}\right)dt$

$\frac{3}{2}t^4 - \frac{7}{3}t^3 - \ln|t| + C$

2. $\int \sqrt{3x+5}\,dx = \frac{2}{9}(3x+5)^{3/2} + C$

3. $\int \left(\frac{x^3 + 2x^2 - 5x}{x}\right)dx = \int \left(x^2 + 2x - 5\right)dx$

$\frac{1}{3}x^3 + x^2 - 5x + C$

4. $\int \left(e^{2x} - 2^x\right)dx = \frac{1}{2}e^{2x} - \frac{2^x}{\ln 2} + C$

5. $\int (3t-5)^{1.8}\,dt = \frac{1}{3}\cdot\frac{1}{2.8}(3t-5)^{2.8} + C$

6. $\frac{d}{dx}\left(\int \frac{dv}{v^2+1}\right) = \frac{1}{v^2+1}$

7. $\int \left(\frac{d}{dx}\left(\frac{1}{v^2+1}\right)\right)dv = \frac{1}{v^2+1} + C$

8. $\int \left(z\sqrt{z} - \frac{1}{z\sqrt{z}}\right)dz = \int \left(z^{1.5} - z^{-1.5}\right)$

$\frac{1}{2.5}z^{2.5} + \frac{1}{0.5}z^{-.5} + C = \frac{2}{5}z^{5/2} + 2z^{-1/2} + C$

Evaluate the following definite integrals.

1. $\int_2^5 \left(4x^3 - 3x^2\right)dx = \left(x^4 - x^3\right)\Big|_2^5 = \left(5^4 - 5^3\right) - \left(2^4 - 2^3\right) = 492$

2. $\int_0^2 2e^{3x}\,dx = \left(\frac{2}{3}e^{3x}\right)\Big|_0^2 = \frac{2}{3}\left(e^6 - e^0\right) = \frac{2}{3}\left(e^6 - 1\right)$

Write a formula for the function that meets the following conditions.

1. $\frac{dy}{dx} = 6x^2 + 4x,\ y(2) = 10$

$y = 2x^3 + 2x^2 - 14$

2. $\frac{dy}{dx} = \frac{6x^2 + 4x}{\sqrt{2x+3}},\ y(2) = 10$

$y = 10 + \int_2^x \frac{6t^2 + 4t}{\sqrt{2t+3}}\,dt$