1. Compute the derivative of the following function:

$$\ln(3x) + \frac{5}{(3x)^5} - \frac{1}{\sqrt[4]{(3x)}}$$

$$\left[\ln(3x) + \frac{5}{(3x^5)} - \frac{1}{\sqrt[4]{(3x)}} \right]' = \left[\ln(3x) + \frac{5}{3} x^{-5} - (3x)^{-1/4} \right]' =$$

$$= \frac{1}{3x} \cdot 3 + \frac{5}{3} \cdot (-5) \cdot x^{-6} - \left(-\frac{1}{4}\right)(3x)^{-5/4} \cdot 3$$

$$\underset{-5-1}{}$$

2. Compute the indefinite integral of the following function:

$$\cos(3x - 1)$$

$$\int \cos(3x-1)\, dx = \frac{\sin(3x-1)}{3} + C$$

as $\int \cos x\, dx = \sin x$ and if $\int f(x)\, dx = F(x)$, then

$$\int f(ax+b)\, dx = \frac{F(ax+b)}{a}$$

3. Find the general solutions of the following differential equation:

$$y'(x) \cancel{y'(t)} = 2 - 3x^2$$

$$y(x) = \int 2 - 3x^2\, dx = 2x - 3 \cdot \frac{x^3}{3} + C = 2x - x^3 + C$$

4. Find the particular solution of the following differential equation:

$$y'(x) \cancel{y'(t)} = 3 - 2x, \quad y(2) = 1.$$

$$y_{general}(x) = \int 3 - 2x\, dx = 3x - 2 \cdot \frac{x^2}{2} + C = 3x - x^2 + C$$

$$y(2) = 1 \Rightarrow 3 \cdot 2 - 2^2 + C = 1 \Rightarrow C = -1$$

$$y_{particular}(x) = 3x - x^2 - 1$$