1a. Convert the following integral to an integral with variable \( \theta \) and with correct limits using the substitution \( x = 2 \sin \theta \):
\[
\int_0^{\sqrt{3}} \frac{x^2}{\sqrt{4-x^2}} \, dx.
\]
Get
\[
\int_0^{\pi/3} 4 \sin^2 \theta \, d\theta
\]

1b. Convert the following integral to an integral with variable \( \theta \) and with correct limits using the substitution \( x = 2 \sin \theta \):
\[
\int_{\sqrt{3}}^1 \frac{x^2 \, dx}{\sqrt{4-x^2}}
\]
Get
\[
\int_{\pi/3}^{\pi/6} 2 \frac{\sin^2 \theta}{\cos \theta} \, d\theta
\]

2. Convert the following integral to an integral with variable \( \theta \) and with correct limits using the substitution \( x = 5 \tan \theta \).
\[
\int_0^5 \frac{x \, dx}{\sqrt{25 + x^2}}
\]
Get
\[
\int_0^{\pi/4} \frac{1}{5} \tan \theta \, d\theta
\]

3a. \[
\int \frac{x^2 \, dx}{\sqrt{3-x^2}} = \frac{1}{3} \sqrt{3-2x^2} + C.
\]

3b. \[
\int \frac{x \, dx}{(x^2-2)^{7/9}} = \frac{9}{7} (x^2-2)^{2/9} + C
\]

3c. \[
\int \frac{dx}{4x-1} = \frac{1}{4} \ln |4x-1| + C
\]

4a. \[
\int \cos^2 (2x) \, dx = \frac{1}{3} \sin (4x) + \frac{x}{4} + C
\]

4b. \[
\int (\sec x + \frac{\cos(2x)}{\cos x}) \, dx = \sin x + C
\]

5a. \[
\int \sin^3 x \cos^2 x \, dx = -\frac{\cos x}{3} + \frac{\cos^5 x}{5} + C
\]

6a. \[
\int \frac{(2x+1) \, dx}{9x^2} = \ln |9 + x^2| + \frac{3}{8} + \frac{1}{3} \tan^{-1} \left( \frac{3}{x} \right) + \frac{3}{6}
\]
6b. \[ \int \frac{x+1}{\sqrt{1-x^2}} \, dx = -\sqrt{1-x^2} + \sin^{-1} x + C \]

7a. \[ \int \frac{dx}{x^2-1} = \frac{1}{2} (\ln |x - 1| - \ln |x + 1|) + C \]

7b. \[ \int \frac{(x^2+1) \, dx}{x(x^2-1)} = \ln |x + 1| + \ln |x - 1| - \ln |x| + C \]

8a. \[ \int x^2 \cos 4x \, dx = \frac{1}{8} \cos (4x) - \frac{2x^2+1}{32} \sin (4x) + C \]

8b. \[ \int e^x \, x \, dx = (x - 1)e^x + C \]

8c. \[ \int x \cosh x \, dx = x \sinh x - \cosh x + C \]

9a. \[ \int \tan^3 x \sec x \, dx = \frac{1}{3} \sec^3 x - \sec x + C \]

10a. \[ \int \frac{x^{1/2}+x^{3/2}+x}{x} \, dx = \ln |x| + \frac{2}{5} x^{5/2} + x + C \]

10b. \[ \int \frac{x^{-2}+x^{-1/2}+x}{x^{1/2}} \, dx = \ln |x| + \frac{2}{5} x^{3/2} - \frac{2}{3} x^{-3/2} + C \]