1a. Perform the substitution $u = e^{3t}$ for the integral $\int \frac{e^{3t}}{\sqrt{1 - e^{6t}}} \, dt$.

Do NOT perform the integration. Fill in your answer here: $\int \text{______________} \, du$

1b. Perform the integral you obtained in (a). What function in $u$ did you get? ___________

1c. Using (b), $\int \frac{e^{3t}}{\sqrt{1 - e^{6t}}} \, dt = $
2a. Perform the substitution \( u = \ln(x^2) \) for the integral \( \int_1^{e^{\pi/4}} \frac{\sin(\ln(x^2))}{x} \, dx \).

Be sure to change the integration limits. Fill in your answer below:

\[
\int_{\text{---}} \underline{\phantom{\int}} \, \, du
\]

2b. Perform the integral you obtained in (a) to evaluate \( \int_1^{e^{\pi/4}} \frac{\sin(\ln(x^2))}{x} \, dx \).
3a. Perform the substitution \( u = x - 1 \) for the integral \( \int \frac{x(x - 2)}{(x - 1)^3} \, dx \).

Do NOT perform the integration. Fill in your answer here: \( \int \) \( \frac{\text{_____________}}{du} \)

3b. Perform the integral you obtained in (a). What function in \( u \) did you get? \( \text{__________} \)

3c. Using (b), \( \int \frac{x(x - 2)}{(x - 1)^3} \, dx = \text{__________} \)
4a. Perform the substitution \( u = 5x^2 + 1 \) for the integral \( \int_{0}^{1} xe^{5x^2+1} \, dx \).

Be sure to change the integration limits. Fill in your answer below:

\[
\int_{\_}^{\_} \quad du
\]

4b. Perform the integral you obtained in (a) to evaluate \( \int_{0}^{1} xe^{5x^2+1} \, dx \).