1. In this problem you will evaluate \( \int_{0}^{2} x \sqrt{x + 7} \, dx \) by making a substitution.

(a) Use the substitution \( u = x + 7 \) to find the indefinite integral \( \int x \sqrt{x + 7} \, dx \).

(b) Use your result from part (a) to evaluate \( \int_{0}^{2} x \sqrt{x + 7} \, dx \).

2. In this problem you will evaluate \( \int_{0}^{2} x \sqrt{x + 7} \, dx \) again, but using a different substitution than before.

(a) Use the substitution \( w = \sqrt{x + 7} \) (or \( x = w^2 - 7 \)) to find \( \int x \sqrt{x + 7} \, dx \).

(b) Use your result from part (a) to evaluate \( \int_{0}^{2} x \sqrt{x + 7} \, dx \).

(c) Compare your results from parts (a) and (b) with those from Problem 1 and verify that they agree. In addition, by whatever method you choose, check your results in some other way.

3. (a) In the preceding two problems, you evaluated the same integral by two different methods. Which solution do you like best? Why?

(b) Using whichever of the two methods you liked best, find \( \int x \sqrt{3x - 5} \, dx \).

(c) Find \( \int_{0}^{1} \frac{x}{(2x + 1)^{\frac{3}{2}}} \, dx \).

4. (a) Find \( \int \frac{e^{\sqrt{t}}}{\sqrt{t}} \, dt \) by substituting \( u = \sqrt{t} \).

(b) Find \( \int \frac{\cos \sqrt{4p + 5}}{\sqrt{4p + 5}} \, dp \).

(c) Find \( \int_{0}^{\sqrt{7}} \frac{x e^{\sqrt{x^2 + 2}}}{\sqrt{x^2 + 2}} \, dx \).

5. (a) Find \( \int \frac{5x + 1}{\sqrt{1 - x^2}} \, dx \) by using the fact that
\[
\int \frac{5x + 1}{\sqrt{1 - x^2}} \, dx = \int \frac{5x}{\sqrt{1 - x^2}} \, dx + \int \frac{1}{\sqrt{1 - x^2}} \, dx.
\]

(b) Find \( \int \frac{3x + 2}{x^2 + 1} \, dx \).

(c) Find \( \int \frac{\arctan x + 2x}{1 + x^2} \, dx \).