1. **Question Details**

Transform this antiderivative problem using the substitution $u = \cos(x)$.

$$\int \tan(x) \, dx = \int \frac{\sin(x)}{\cos(x)} \, dx$$

The substitution implies that

$$\sin(x) \, dx = \text{[in terms of } u\text{]}$$

Write the new antiderivative problem, in terms of $u$.

$$\int \text{[in terms of } u\text{]} \, dx$$

Compute the antiderivative, in terms of $u$. Include $+C$.

$$\int \text{[in terms of } u\text{]} \, dx + C$$

Complete the original problem. Write in terms of $x$. Include $+C$.

$$\int \tan(x) \, dx = \text{[in terms of } x\text{]} + C$$

2. **Question Details**

Use the substitution $u = 1 + \cos^2(x)$ to compute the antiderivative:

$$\int \frac{\sin(2x)}{1 + \cos^2(x)} \, dx$$

The double angle identity $\sin(2x) = 2\sin(x)\cos(x)$ will be helpful.

a. Enter the transformed antiderivative problem, written entirely in terms of $u$.

$$\int \text{[in terms of } u\text{]} \, dx$$

b. Compute the original antiderivative. Write in terms of $x$. Include $+C$.

$$\int \frac{\sin(2x)}{1 + \cos^2(x)} \, dx = \text{[in terms of } x\text{]} + C$$
3. **Question Details**

Use the substitution \( u = x^2 + 1 \) to compute the antiderivative:

\[
\int \frac{x}{x^2 + 1} \, dx
\]

a. Enter the transformed antiderivative problem, written entirely in terms of \( u \).

\[
\int \underline{} \, du
\]

b. Compute the original antiderivative. Write in terms of \( x \). Include +C.

\[
\int \frac{x}{x^2 + 1} \, dx = \underline{}
\]

4. **Question Details**

Use the substitution \( u = x^2 + 1 \) to compute the antiderivative:

\[
\int \frac{x}{(x^2 + 1)^2} \, dx
\]

a. Enter the transformed antiderivative problem, written entirely in terms of \( u \).

\[
\int \underline{} \, du
\]

b. Compute the original antiderivative. Write in terms of \( x \). Include +C.

\[
\int \frac{x}{(x^2 + 1)^2} \, dx = \underline{}
\]

5. **Question Details**

Compute the antiderivative \( \int \frac{(u + 1)^2}{u} \, du \). No substitution is needed. Include +C.

Hint: Expand the numerator then write as a sum of power functions, \( u^p \).

\[
\int \frac{(u + 1)^2}{u} \, du = \underline{}
\]

6. **Question Details**

Find the antiderivative

\[
\int \frac{x^2}{2x + 3} \, dx
\]

a. Transform the problem using the substitution \( u = 2x + 3 \). Enter the transformed antiderivative problem written entirely with \( u \).

\[
\int \underline{} \, du = \int \underline{} \, du
\]

b. Compute the original antiderivative. Write in terms of \( x \). Include +C.

\[
\int \frac{x^2}{2x + 3} \, dx = \underline{}
\]