1. **Question Details**

Evaluate the following indefinite integral using the method of **Partial Fractions**.

\[ \int \frac{x}{(3x - 1)(2x + 1)} \, dx \]

a. Assume that the integrand can be written as the sum of the following two fractions:

\[ \frac{A}{3x - 1} + \frac{B}{2x + 1} \]

Set up a system of equations and solve for the constants \( A \) and \( B \).

b. Use the partial fraction decomposition of the integrand to rewrite the integral.

\[ \int \frac{x}{(3x - 1)(2x + 1)} \, dx = \]

Use the partial fraction decomposition to find the antiderivative of the original rational expression.

Use +\( K \) for the constant of integration.

\[ \int \frac{x}{(3x - 1)(2x + 1)} \, dx = \]

2. **Question Details**

Evaluate the following indefinite integral using the method of **Partial Fractions**.

\[ \int \frac{3}{(x - \sqrt{3})(x + \sqrt{3})} \, dx \]

a. Assume that the integrand can be written as the sum of the following two fractions:

\[ \frac{A}{x - \sqrt{3}} + \frac{B}{x + \sqrt{3}} \]

Set up a system of equations and solve for the constants \( A \) and \( B \).

b. Use the partial fraction decomposition of the integrand to rewrite the integral.

\[ \int \frac{3}{(x - \sqrt{3})(x + \sqrt{3})} \, dx = \]

c. Use the partial fraction decomposition to find the antiderivative of the original rational expression.

Use +\( K \) for the constant of integration.

\[ \int \frac{3}{(x - \sqrt{3})(x + \sqrt{3})} \, dx = \]
This problem, and the next two problems, are examples of antiderivatives that appear in some partial fraction decompositions. Include +\(K\) in antiderivatives.

a. Trigonometric Substitution problem #13 computed the antiderivative
\[
\int \frac{dx}{a^2 + x^2} = \frac{1}{a} \tan^{-1} \left( \frac{x}{a} \right) + K
\]
Use this to find the following antiderivative
\[
\int \frac{2}{9 + x^2} \, dx = \quad \quad \\
\]

b. Use \(u\)-substitution to find the following antiderivative
\[
\int \frac{5x}{9 + x^2} \, dx = \quad \quad \\
\]

c. Use the results from (a) and (b) to find the following antiderivative
\[
\int \frac{5x - 2}{9 + x^2} \, dx = \quad \quad \\
\]

Evaluate the following indefinite integral using the method of **Partial Fractions**.
\[
\int \frac{-8}{x(x^2 + 4)} \, dx
\]

1. Assume that the integrand can be written in the form:
\[
\frac{A}{x} + \frac{Bx + C}{x^2 + 4}
\]
Set up a system of equations and solve for the constants \(A\), \(B\) and \(C\).

2. Use the partial fraction decomposition of the integrand to rewrite the integral.
\[
\int \quad \quad \\
\]

3. Use the partial fraction decomposition to find the antiderivative of the original rational expression.
Use +\(K\) for the constant of integration.
\[
\int \frac{-8}{x(x^2 + 4)} \, dx = \quad \quad \\
\]
Evaluate the following indefinite integral using the method of **Partial Fractions**.

\[ \int \frac{2x - 4x^2}{(x^2 + 1)(x + 2)} \, dx \]

1. Assume that the integrand can be written in the form:

\[ \frac{Ax + B}{x^2 + 1} + \frac{C}{x + 2} \]

Set up a system of equations and solve for the constants \( A \), \( B \) and \( C \).

2. Use the partial fraction decomposition of the integrand to rewrite the integral.

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

3. Use the partial fraction decomposition to find the antiderivative of the original rational expression.

Use \( +K \) for the constant of integration.

\[ \int \frac{2x - 4x^2}{(x^2 + 1)(x + 2)} \, dx = \]

Assignment Details