Contest Report: **Autumn Integration Bee Contest**

Integration Bee

2024-10-18 15:54:32

1 Participants (25 max):

admin admin None
test test None

2 preliminary

2.1 Integral

(difficulty 5)

$$I = \int_1^2 xe^x \, dx$$

2.2 Solution:

Step 1: Apply the formula for integration by parts

$$\int u \, dv = uv - \int v \, du$$

Step 2: Choose u and dv

$$u = x \quad \text{and} \quad dv = e^x \, dx$$

Step 3: Differentiate u and integrate dv

$$du = dx \quad \text{and} \quad v = e^x$$

Step 4: Apply the formula for integration by parts

$$I = \int_1^2 xe^x \, dx = [xe^x]_1^2 - \int_1^2 e^x \, dx$$

Step 5: Compute the remaining integral

$$I = [xe^x]_1^2 - [e^x]_1^2$$

Step 6: Substitute the limits of integration

$$I = \left(2e^2 - e^1\right) - \left(e^2 - e^1\right)$$

Step 7: Simplify the expression

$$I = 2e^2 - e - e^2 + e$$

Step 8: Final result

$$I = e^2$$

2.3 Integral

(difficulty 5)

$$I = \int_1^2 xe^x \, dx$$

2.4 Solution:

Step 1: Apply the formula for integration by parts

$$\int u \, dv = uv - \int v \, du$$

Step 2: Choose u and dv

$$u = x \quad \text{and} \quad dv = e^x \, dx$$

Step 3: Differentiate u and integrate dv

$$du = dx \quad \text{and} \quad v = e^x$$

Step 4: Apply the formula for integration by parts

$$I = \int_1^2 xe^x \, dx = [xe^x]_1^2 - \int_1^2 e^x \, dx$$

Step 5: Compute the remaining integral

$$I = [xe^x]_1^2 - [e^x]_1^2$$

Step 6: Substitute the limits of integration

$$I = \left(2e^2 - e^1\right) - \left(e^2 - e^1\right)$$

Step 7: Simplify the expression

$$I = 2e^2 - e - e^2 + e$$

Step 8: Final result

$$I = e^2$$

2.5 Integral

(difficulty 5)

$$I = \int_1^2 xe^x \, dx$$

2.6 Solution:

Step 1: Apply the formula for integration by parts

$$\int u\,dv = uv - \int v\,du$$

Step 2: Choose u and dv

$$u = x \quad \text{and} \quad dv = e^x\,dx$$

Step 3: Differentiate u and integrate dv

$$du = dx \quad \text{and} \quad v = e^x$$

Step 4: Apply the formula for integration by parts

$$I = \int_1^2 xe^x\,dx = [xe^x]_1^2 - \int_1^2 e^x\,dx$$

Step 5: Compute the remaining integral

$$I = [xe^x]_1^2 - [e^x]_1^2$$

Step 6: Substitute the limits of integration

$$I = \left(2e^2 - e^1\right) - \left(e^2 - e^1\right)$$

Step 7: Simplify the expression

$$I = 2e^2 - e - e^2 + e$$

Step 8: Final result

$$I = e^2$$

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3 semifinals

3.1 Integral

(difficulty 5)

$$I = \int_1^2 xe^x\,dx$$

3.2 Solution:

Step 1: Apply the formula for integration by parts

$$\int u\,dv = uv - \int v\,du$$

Step 2: Choose u and dv

$$u = x \quad \text{and} \quad dv = e^x\,dx$$

Step 3: Differentiate u and integrate dv

$$du = dx \quad \text{and} \quad v = e^x$$

Step 4: Apply the formula for integration by parts

$$I = \int_1^2 xe^x \, dx = [xe^x]_1^2 - \int_1^2 e^x \, dx$$

Step 5: Compute the remaining integral

$$I = [xe^x]_1^2 - [e^x]_1^2$$

Step 6: Substitute the limits of integration

$$I = \left(2e^2 - e^1\right) - \left(e^2 - e^1\right)$$

Step 7: Simplify the expression

$$I = 2e^2 - e - e^2 + e$$

Step 8: Final result

$$I = e^2$$

3.3 Integral

(difficulty 5)

$$I = \int_1^2 xe^x \, dx$$

3.4 Solution:

Step 1: Apply the formula for integration by parts

$$\int u \, dv = uv - \int v \, du$$

Step 2: Choose u and dv

$$u = x \quad \text{and} \quad dv = e^x \, dx$$

Step 3: Differentiate u and integrate dv

$$du = dx \quad \text{and} \quad v = e^x$$

Step 4: Apply the formula for integration by parts

$$I = \int_1^2 xe^x \, dx = [xe^x]_1^2 - \int_1^2 e^x \, dx$$

Step 5: Compute the remaining integral

$$I = [xe^x]_1^2 - [e^x]_1^2$$

Step 6: Substitute the limits of integration

$$I = \left(2e^2 - e^1\right) - \left(e^2 - e^1\right)$$

Step 7: Simplify the expression

$$I = 2e^2 - e - e^2 + e$$

Step 8: Final result

$$I = e^2$$

3.5 Integral

(difficulty 5)

$$I = \int_1^2 xe^x \, dx$$

3.6 Solution:

Step 1: Apply the formula for integration by parts

$$\int u \, dv = uv - \int v \, du$$

Step 2: Choose u and dv

$$u = x \quad \text{and} \quad dv = e^x \, dx$$

Step 3: Differentiate u and integrate dv

$$du = dx \quad \text{and} \quad v = e^x$$

Step 4: Apply the formula for integration by parts

$$I = \int_1^2 xe^x \, dx = [xe^x]_1^2 - \int_1^2 e^x \, dx$$

Step 5: Compute the remaining integral

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Step 6: Substitute the limits of integration

$$I = \left(2e^2 - e^1\right) - \left(e^2 - e^1\right)$$

Step 7: Simplify the expression

$$I = 2e^2 - e - e^2 + e$$

Step 8: Final result

$$I = e^2$$

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4 finals

4.1 Integral

(difficulty 5)

$$I = \int_1^2 xe^x \, dx$$

4.2 Solution:

Step 1: Apply the formula for integration by parts

$$\int u \, dv = uv - \int v \, du$$

Step 2: Choose u and dv

$$u = x \quad \text{and} \quad dv = e^x \, dx$$

Step 3: Differentiate u and integrate dv

$$du = dx \quad \text{and} \quad v = e^x$$

Step 4: Apply the formula for integration by parts

$$I = \int_1^2 xe^x \, dx = [xe^x]_1^2 - \int_1^2 e^x \, dx$$

Step 5: Compute the remaining integral

$$I = [xe^x]_1^2 - [e^x]_1^2$$

Step 6: Substitute the limits of integration

$$I = \left(2e^2 - e^1\right) - \left(e^2 - e^1\right)$$

Step 7: Simplify the expression

$$I = 2e^2 - e - e^2 + e$$

Step 8: Final result

$$I = e^2$$

4.3 Integral

(difficulty 5)

$$I = \int_1^2 xe^x \, dx$$

4.4 Solution:

Step 1: Apply the formula for integration by parts

$$\int u\,dv = uv - \int v\,du$$

Step 2: Choose u and dv

$$u = x \quad \text{and} \quad dv = e^x\,dx$$

Step 3: Differentiate u and integrate dv

$$du = dx \quad \text{and} \quad v = e^x$$

Step 4: Apply the formula for integration by parts

$$I = \int_1^2 xe^x\,dx = [xe^x]_1^2 - \int_1^2 e^x\,dx$$

Step 5: Compute the remaining integral

$$I = [xe^x]_1^2 - [e^x]_1^2$$

Step 6: Substitute the limits of integration

$$I = \left(2e^2 - e^1\right) - \left(e^2 - e^1\right)$$

Step 7: Simplify the expression

$$I = 2e^2 - e - e^2 + e$$

Step 8: Final result

$$I = e^2$$

4.5 Integral

(difficulty 5)

$$I = \int_1^2 xe^x\,dx$$

4.6 Solution:

Step 1: Apply the formula for integration by parts

$$\int u\,dv = uv - \int v\,du$$

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