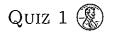
Name: Ridrand



MATH 201 January 16, 2025

Use substitution to find the following integrals. State clearly what your substitution is. Show all steps.

1.
$$\int \frac{\sin(x)}{\sqrt{\cos(x)}} dx = \int \left(\cos(x) \right)^{-1/2} \sin(x) dx$$

$$\int u = \cos(x)$$

$$\int du = -\sin(x)$$

$$du = -\sin(x) dx$$

$$= \int u^{-1/2} (-1) du = - \int u^{-1/2} du$$

$$= -\frac{u^{-1/2}+1}{-v+1} + C$$

$$du = -\sin(x) dx$$

$$(-1)du = \sin(x) dx$$

$$-\frac{u^{2}}{2}+C=-2\sqrt{u}+C$$

2.
$$\int_{0}^{\ln(2)} \frac{e^{x}}{5 + e^{x}} dx = \int_{0}^{\ln(2)} \frac{e^{x}}{5 + e^{x}} dx = \int_{0}^{2\pi} \frac{1}{5 + e^{x}} dx$$

$$\begin{cases} u = 5 + e^{x} \\ du = e^{x} \\ du = e^{x} dx \end{cases}$$

$$\begin{cases} du = e^{x} dx \end{cases}$$

$$= \int_{6}^{1} \frac{du}{dt} = \left[\frac{1}{2} \ln \left[u \right] \right]_{6}^{1}$$

$$= ln |7| - ln |6|$$

 $- ln |2|$

Richard

Quiz 1

MATH 201 January 16, 2025

Use substitution to find the following integrals. State clearly what your substitution is. Show all steps.

1.
$$\int \frac{(3+2\ln|x|)^7}{x} dx = \int (3+2\ln|x|)^7 \frac{1}{x} dx = \int u^7 \frac{1}{2} du$$

$$= \frac{1}{2} \int u^7 du = \frac{1}{2} \frac{u^8}{8} + C$$

$$\begin{cases} u = 3 + 2 \ln|x| \\ du = 2 \cdot \frac{1}{x} \\ du = \frac{2}{x} dx \end{cases}$$

$$\begin{cases} du = \frac{2}{x} dx \\ \frac{1}{2} du = \frac{1}{x} dx \end{cases}$$

$$\frac{1}{2}du = \frac{1}{x}dx$$

$$= \frac{1}{2} \int u^7 du = \frac{1}{2} \frac{u^8}{8} + C$$

$$= \frac{(3 + 2 \ln |x|)^8}{16} + C$$

2.
$$\int_{0}^{\ln \sqrt{3}} \frac{e^{x}}{1 + (e^{x})^{2}} dx = \int_{0}^{\ln \sqrt{3}} \frac{1}{1 + (e^{x})^{2}} e^{x} dx = \int_{1 + u^{2}}^{1} \frac{1}{1 + u^{2}} du$$

$$\begin{cases} u = e^{x} \\ dx = e^{x} \end{cases}$$

$$= \int_{1 + u^{2}}^{1} du = \left[\frac{1}{1 + u^{2}} du \right]_{1}^{1}$$

$$= \int_{1 + u^{2}}^{1} du = \left[\frac{1}{1 + u^{2}} du \right]_{1}^{1}$$

$$= \int_{1 + u^{2}}^{1} du = \left[\frac{1}{1 + u^{2}} du \right]_{1}^{1}$$

$$= \int_{1 + u^{2}}^{1} du = \left[\frac{1}{1 + u^{2}} du \right]_{1}^{1}$$

$$= \int_{1 + u^{2}}^{1} du = \left[\frac{1}{1 + u^{2}} du \right]_{1}^{1}$$

$$= \int_{1 + u^{2}}^{1} du = \left[\frac{1}{1 + u^{2}} du \right]_{1}^{1}$$

$$= \int_{1 + u^{2}}^{1} du = \left[\frac{1}{1 + u^{2}} du \right]_{1}^{1}$$

$$= \int_{1 + u^{2}}^{1} du = \left[\frac{1}{1 + u^{2}} du \right]_{1}^{1}$$

$$= \int_{1 + u^{2}}^{1} du = \left[\frac{1}{1 + u^{2}} du \right]_{1}^{1}$$