

IN CLASS QUIZ 1

NAME: _____

1. Evaluate $\int 2x(x^2 + 9)^5 dx$.

$$\text{Let } u = x^2 + 9$$

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

$$\begin{aligned} \text{so } \int (x^2 + 9)^5 2x dx &= \int u^5 du = \frac{1}{6} u^6 + C \\ &= \frac{1}{6} (x^2 + 9)^6 + C \end{aligned}$$

2. Evaluate $\int x^2(x+1)^7 dx$.

$$u = x + 1$$

$$du = dx$$

$$x = u - 1$$

$$\begin{aligned} \int x^2(x+1)^7 dx &= \int (u-1)^2 u^7 du \\ &= \int u^9 - 2u^8 + u^7 du \\ &= \frac{1}{10} u^{10} - \frac{2}{9} u^9 + \frac{1}{8} u^8 + C \\ &= \frac{1}{10} (x+1)^{10} - \frac{2}{9} (x+1)^9 + \frac{1}{8} (x+1)^8 + C \end{aligned}$$

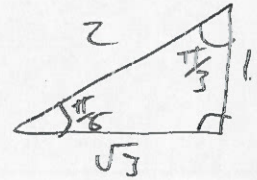
3. Evaluate $\int_0^{\pi/3} \tan^3(x) \sec^2(x) dx$.

$$\text{let } u = \tan(x)$$

$$\frac{du}{dx} = \sec^2(x) \Rightarrow du = \sec^2(x) dx$$

$$u(0) = \tan(0) = 0$$

$$u\left(\frac{\pi}{3}\right) = \tan\left(\frac{\pi}{3}\right) = \sqrt{3}$$



$$\int_0^{\pi/3} \tan^3(x) \sec^2(x) dx = \int_0^{\sqrt{3}} u^3 du = \frac{1}{4} u^4 \Big|_0^{\sqrt{3}} = \frac{1}{4} \sqrt{3}^4 = \frac{1}{4} 3^2 = \frac{9}{4}$$

4. Evaluate $\int \frac{dt}{\sqrt{25-4t^2}}$.

$$\text{recall } \int \frac{dx}{\sqrt{1-x^2}} = \sin^{-1}(x) + C$$

$$\sqrt{25-4t^2} = \sqrt{25\left(1-\frac{4t^2}{25}\right)} = 5\sqrt{1-\left(\frac{2t}{5}\right)^2}$$

so

$$\int \frac{dt}{\sqrt{25-4t^2}} = \frac{1}{5} \int \frac{dt}{\sqrt{1-\left(\frac{2t}{5}\right)^2}}$$

$$\text{let } u = \frac{2t}{5} \Rightarrow du = \frac{2}{5} dt \Rightarrow \frac{5}{2} du = dt$$

$$\begin{aligned} \text{so } \frac{1}{5} \int \frac{dt}{\sqrt{1-\left(\frac{2t}{5}\right)^2}} &= \frac{1}{5} \cdot \frac{5}{2} \int \frac{du}{\sqrt{1-u^2}} = \frac{1}{2} \sin^{-1}(u) + C \\ &= \frac{1}{2} \sin^{-1}\left(\frac{2t}{5}\right) + C \end{aligned}$$