

MATH 242 - Quiz 4 REMIX

02/15/2024

1. [5 pts] Evaluate the definite integral via Integration by Parts:

$$\begin{array}{l}
 \frac{u = 2x-1 \mid dv = \cos(x) dx}{du = 2 dx \mid v = \sin(x)} \\
 \int_0^{\pi/4} \ln(e^{2x-1}) \cos(x) dx = \int_0^{\pi/4} (2x-1) \cos(x) dx \\
 = \left((2x-1) \sin(x) \right) \Big|_0^{\pi/4} - 2 \int_0^{\pi/4} \sin(x) dx \\
 = \left(\frac{\sqrt{2}}{2} - 1 \right) \frac{\sqrt{2}}{2} + \left(2 \cos(x) \right) \Big|_0^{\pi/4} \\
 = \frac{\sqrt{2}(\pi-2)}{4} + \sqrt{2} - 2
 \end{array}$$

$$\tan^4 = (\tan^2)^2 = (\sec^2 - 1)^2$$

2. [5 pts] Evaluate the definite integral

$$\int_0^{\pi/4} \tan^5(x) \sec(x) dx$$

$$u = \sec(x)$$

$$du = \sec(x) \tan(x) dx$$

$$\int_1^{\sqrt{2}} (u^2 - 1)^2 du$$

$$\int_1^{\sqrt{2}} u^4 - 2u^2 + 1 du$$

$$\left(\frac{u^5}{5} - \frac{2u^3}{3} + u \right) \Big|_1^{\sqrt{2}}$$

$$\left(u \left(\frac{u^4}{5} - \frac{2u^2}{3} + 1 \right) \right) \Big|_1^{\sqrt{2}}$$

$$\sqrt{2} \left(\frac{4}{5} - \frac{4}{3} + 1 \right) - \left(\frac{1}{5} - \frac{2}{3} + 1 \right)$$