

# KEY

1

## Quiz II for Math252

July 23, 2009

Name:

Instructions: There are two questions. You are given 30 minutes. Show all your work to get partial credits. Good luck!

1. Evaluate

$$I = \int_0^{\frac{\pi}{2}} e^{\sin(x)} \cos(x) dx$$

Let  $u = \sin(x)$ . Then  $du = \cos(x) dx$

$$I = \int_0^1 e^u du = \left. e^u \right|_0^1 = e^1 - e^0 = e - 1.$$

2. Evaluate

$$I = \int_0^1 \frac{r^3}{\sqrt{4+r^2}} dr$$

$$\text{Let } u = r^2 \text{ and } dv = \frac{r}{\sqrt{4+r^2}} dr \Rightarrow \begin{cases} du = 2r dr \\ v = \sqrt{4+r^2} \end{cases}$$

$$\text{Then } I = \left[ r^2 \cdot \sqrt{4+r^2} \right]_0^1 - \int_0^1 2r \cdot \sqrt{4+r^2} dr$$

$$= \sqrt{5} - \left[ \frac{2}{3} (4+r^2)^{\frac{3}{2}} \right]_0^1$$

$$= \sqrt{5} - \frac{2}{3} \left( 5^{\frac{3}{2}} - 4^{\frac{3}{2}} \right)$$

$$= \sqrt{5} - \frac{2}{3} \cdot 5\sqrt{5} + \frac{2}{3} \cdot 8$$

$$= \frac{-7\sqrt{5} + 16}{3} \approx \frac{-15.652 + 16}{3} = \frac{.348}{3} = .116$$