

Quiz 2, Calculus 2

1:25

1:30

5 min.

Name: key

Evaluate the integrals. Make sure to use appropriate notation and show your work. No calculators allowed!

1. (4 points) $\int_1^e \frac{\ln x}{x^2} dx$

$$u = \ln x$$
$$du = \frac{1}{x} dx$$

$$dv = x^{-2} dx$$
$$v = -\frac{1}{x}$$

$$= \frac{\ln x}{x} \Big|_1^e + \int_1^e x^{-2} dx \checkmark$$

$$= -\left(\frac{\ln e}{e} - \frac{\ln 1}{1}\right) - \frac{1}{x} \Big|_1^e \quad \frac{1}{2}$$

$$= -\frac{1}{e} - \frac{1}{e} + 1$$

$$= \boxed{-\frac{2}{e} + 1} \quad \frac{1}{2}$$

$$2. (3 \text{ points}) \int_1^{\infty} \frac{1}{(2x+1)^3} dx$$

$$= \lim_{b \rightarrow \infty} \int_1^b \frac{1}{(2x+1)^3} dx \quad \checkmark$$

$$= \lim_{b \rightarrow \infty} \left. -\frac{1}{4} (2x+1)^{-2} \right|_1^b \quad \checkmark$$

$$= \lim_{b \rightarrow \infty} -\frac{1}{4} \left(\frac{1}{(2b+1)^2} - \frac{1}{(2+1)^2} \right)$$

$$= -\frac{1}{4} \left(0 - \frac{1}{9} \right)$$

$$= \boxed{\frac{1}{36}} \quad \checkmark$$

$$3. (3 \text{ points}) \int \frac{12}{x^2+4x-5} dx = \int \frac{12}{(x+5)(x-1)} dx \quad \checkmark$$

$$\frac{A}{x+5} + \frac{B}{x-1} = \frac{Ax - A + Bx + 5B}{(x+5)(x-1)} \Rightarrow$$

$$A+B=0$$

$$5B-A=12 \quad \checkmark$$

$$\Rightarrow 6B=12$$

$$B=2$$

$$A=-2$$

$$\Rightarrow \int \left(\frac{-2}{x+5} + \frac{2}{x-1} \right) dx \quad \checkmark$$

$$= \boxed{-2 \ln|x+5| + 2 \ln|x-1| + C}$$