Key

QUIZ 10

1. (8 points) Which of the following integrals are improper? If an integral is improper, identify what makes it improper.

$\int_{-1}^{1} \frac{1}{x^5}\,dx$ improper $x \neq 0$

$\int_{4}^{\infty} 3e^{-x/2}\,dx$ improper $x \neq \infty$

$\int_{0}^{\pi/4} \frac{5}{1-\sin x}\,dx$ not improper

$\int_{0}^{1} \frac{4x}{\sqrt{x^2-1}}\,dx$ improper $x \neq 1$

2. (2 points) Does the following integral converge or diverge?

$\int_{1}^{\infty} \frac{1}{x\sqrt{x}}\,dx$

$= \lim_{t\to\infty} \int_{1}^{t} x^{-3/2}\,dx$

$= \lim_{t\to\infty} -2x^{-1/2}\Big|_{1}^{t}$

$= \lim_{t\to\infty} \left[\frac{-2}{\sqrt{t}} + \frac{2}{\sqrt{1}}\right]$

$= 0 + 2$

$= 2$