

WRITE YOUR NAME:

MAC 2312 Quiz 4  
Wednesday March 29th

Question 1. Determine whether the improper integral converges or diverges.  
If it converges, find its value.

$$\int_9^{\infty} \frac{1}{x\sqrt{x}} dx$$

$$\begin{aligned} \text{Consider } \int_9^M \frac{1}{x\sqrt{x}} dx &= \int_9^M \frac{1}{x \cdot x^{1/2}} dx \\ &= \int_9^M \frac{1}{x^{3/2}} dx = \int_9^M x^{-3/2} dx \end{aligned}$$

$$= \left[ \frac{x^{-1/2}}{-1/2} \right]_9^M = \left[ -\frac{2}{1} \cdot \frac{1}{x^{1/2}} \right]_9^M$$

$$= \left[ -\frac{2}{\sqrt{x}} \right]_9^M = \left[ \frac{2}{\sqrt{x}} \right]_M^9 = \frac{2}{\sqrt{9}} - \frac{2}{\sqrt{M}}$$

$$\text{Then } \lim_{M \rightarrow \infty} \left( \frac{2}{\sqrt{9}} - \frac{2}{\sqrt{M}} \right) = \frac{2}{\sqrt{9}} - 0 = \boxed{\frac{2}{3}}$$

(The integral converges and its value is  $\frac{2}{3}$ )