

9. [12 points]

- a. [6 points] Show that the following integral diverges. Give full evidence supporting your answer, showing all your work and indicating any theorems about improper integrals you use.

$$\int_1^{\infty} \frac{\cos(\frac{1}{t})}{\sqrt{t}} dt$$

- b. [6 points] Find the limit

$$\lim_{x \rightarrow \infty} \frac{\int_1^x \frac{\cos(\frac{1}{t})}{\sqrt{t}} dt}{\sqrt{x}}$$