7. [13 points] Consider the following improper integrals. Show all your work to receive full credit.

a. [5 points] Determine the convergence or divergence of the following improper integral. If the integral converges, compute its value.

$$\int_0^{\frac{\pi}{2}} \frac{\cos x}{\sqrt{\sin x}} dx$$

Determine the convergence or divergence of the following improper integrals. Circle your answers.

b. [4 points] $\displaystyle\int_2^{\infty} \frac{5 - 3\sin(2x)}{x^2} dx$ Converges Diverges

c. [4 points] $\displaystyle\int_1^{\infty} \frac{1}{x}\sqrt{a^2 + \frac{1}{\sqrt{x}}}\, dx$, where a is a positive constant.

Converges Diverges