4. [12 points] For each of the following statements, circle True if the statement is always true and circle False otherwise. No justification is necessary.

a. [2 points] The differential equation $y' = \sin(\sin(y))$ has an infinite number of equilibrium solutions.

True False

b. [2 points] If $C(x)$ is a cumulative distribution function then $\int_{-\infty}^{\infty} C(x)\,dx$ converges.

True False

c. [2 points] The integral $\int_0^1 \frac{1}{\sin(x)}\,dx$ converges

True False

d. [2 points] If $p(x)$ is a probability density function with $p(5) = 0$ then 5 cannot be the mean of the probability distribution.

True False

e. [2 points] If c is any constant then $y = 1 + ce^{-\frac{1}{2}x^2}$ is a solution to the differential equation $y' = x - xy$.

True False

f. [2 points] The area of the region enclosed by the graph of $r = 2\sin(\theta)$ in the cartesian plane is given by $\displaystyle\int_0^{2\pi} 2\sin(\theta)^2\,d\theta$

True False