1. [12 points] Indicate if each of the following is true or false by circling the correct answer. No justification is required.

a. [2 points] The function $y(t) = \cos 3t + B \sin 3t + \frac{1}{9}t$ is a solution of $y'' + 9y = 0$ with $y(0) = 1$.

True False

b. [2 points] The value of the integral used to compute the area enclosed by a curve $r = f(\theta)$ given in polar coordinates can be negative if $f(\theta) \leq 0$.

True False

c. [2 points] If $f(x)$ is a continuous function such that $\int_1^\infty f(x)dx$ diverges, then $\int_1^\infty f(x)^2 dx$ must diverge.

True False

d. [2 points] If $P(x)$ is a cumulative distribution function for the probability density function $p(x)$, then $1 + P(x)$ is also a cumulative distribution function for $p(x)$.

True False

e. [2 points] All solutions to the differential equation $y' = 1 + y^4$ are increasing functions.

True False

f. [2 points] Let $P(t)$ be the cumulative distribution function of a probability density function $p(t)$. If $P(0) = \frac{2}{3}$ then the median of $p(t)$ is negative.

True False