1. [12 points] Indicate whether each of the following statements are true or false by circling the correct answer. **You do not need to justify your answers.**

a. [2 points] The curve defined by the parametric equations $x = 1 - \cos t$ and $y = t - \sin t$ has a vertical tangent line when $t = \pi$.

True False

b. [2 points] If the sequence a_n converges to 0 and $\sum_{n=1}^{\infty} b_n$ converges, then $\sum_{n=1}^{\infty}(a_n + b_n)$ converges.

True False

c. [2 points] The graph of a polar function $r = f(\theta)$ in the (x, y)-plane has a horizontal tangent line at $\theta = a$ if $f'(a) = 0$.

True False

d. [2 points] The integral $\int_0^1 \pi x^4 dx$ computes the volume of the solid obtained by rotating the graph of $y = x^2$ around the x axis for $0 \leq x \leq 1$.

True False

e. [2 points] Let $\sum_{n=1}^{\infty} \frac{(-1)^n}{n^2+1} x^n$ be the Taylor series of $f(x)$ about 0. Then $f(x)$ is concave up at $x = 0$.

True False

f. [2 points] The integral test says that $\sum_{n=1}^{\infty} \frac{1}{n^2} = \int_1^{\infty} \frac{1}{x^2} dx$.

True False