1. [10 points] Indicate if each of the following is true or false by circling the correct answer. No justification is required.

a. [2 points] Let $-1 < q < 1$, then

$$\sum_{n=1}^{\infty} q^n = q + q^2 + q^3 + \cdots + q^n + \cdots = \frac{q}{1-q}.$$

True   False

b. [2 points] Let $F(t)$ be an antiderivative of a continuous function $f(t)$. If the units of $f(t)$ are meters and t is in seconds, then the units of $F(t)$ are meters per second.

True   False

c. [2 points] If the motion of a particle is given by the parametric equations

$$x = \frac{at}{1+t^3}, \quad y = \frac{at^2}{1+t^3} \quad \text{for} \quad a > 0,$$

then the particle approaches the origin as t goes to infinity.

True   False

d. [2 points] Let a_n be a sequence of positive numbers satisfying $\lim_{n\to\infty} a_n = \infty$. Then the series $\sum_{n=1}^{\infty} \frac{1}{a_n}$ converges.

True   False

e. [2 points] Let $f(x)$ be a continuous function. Then

$$\int_0^1 f(2x)dx = \frac{1}{2}\int_0^1 f(x)dx.$$

True   False