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 a_n be a sequence of positive numbers. If $a_n \leq \frac{7^n}{2^{3n}-1}$ for all values of $n \geq 1$, then a_n must converge.

True False

b. [2 points] The trapezoid rule is guaranteed to give an underestimate of $\int_{-\pi}^{\pi} \cos t dt$.

True False

c. [2 points] If the area A under the graph of a positive continuous function $f(x)$ is infinite, then the volume of the solid generated by rotating A around the x-axis could be either infinite or finite depending on the function $f(x)$.

True False

d. [2 points] If $H(x) = \int_0^x f(t)g(t)dt$, then $H'(x) = f'(x)g(x) + f(x)g'(x)$.

True False

e. [2 points] If $(x(t), y(t))$ gives a parametrization of the unit circle centered at the origin, then $\int_0^{2\pi} \sqrt{\left(\frac{dx}{dt}\right)^2 + \left(\frac{dy}{dt}\right)^2} dt = 2\pi$.

True False