8. [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] If \( f(x) \) is positive and continuous, then \( F(x) = \int_{-e^x}^{0} f(t) \, dt \) is increasing for all \( x \).

\[
\begin{array}{c|c}
\text{True} & \text{False} \\
\end{array}
\]

b. [2 points] If \( E(x) \) is an antiderivative of \( e^x \) then \( \ln(E(x)) = E(\ln(x)) \).

\[
\begin{array}{c|c}
\text{True} & \text{False} \\
\end{array}
\]

c. [2 points] If \( g(x) \) is concave up and increasing on \([a, b]\) then \( \int_{a}^{b} g(x) \, dx < \text{Trap}(5) < \text{Right}(5) \).

\[
\begin{array}{c|c}
\text{True} & \text{False} \\
\end{array}
\]

d. [2 points] If \( \int_{0}^{1} p(x) \, dx > \int_{0}^{1} q(x) \, dx \), then \( p(x) > q(x) \) for every \( x \) in \([0, 1]\).

\[
\begin{array}{c|c}
\text{True} & \text{False} \\
\end{array}
\]

e. [2 points] If \( v(x) \) is a continuous even function, then \( \int_{-2}^{2} v(x) \, dx = \int_{0}^{4} v(x) \, dx \).

\[
\begin{array}{c|c}
\text{True} & \text{False} \\
\end{array}
\]

f. [2 points] If \( f(x) \) is a continuous function, and \( F(x) \) is an antiderivative of \( f(x) \), then \( F(x) = \int_{3}^{x} f(t) \, dt + K \) for some constant \( K \).

\[
\begin{array}{c|c}
\text{True} & \text{False} \\
\end{array}
\]