Consider a continuous random variable with the uniform probability density function

\[
f(x) = \begin{cases} \frac{1}{B-A} & A < x < B \\ 0 & \text{otherwise} \end{cases}
\]

a. Verify that \( f(x) \) is normalized, i.e., that

\[
\int_{-\infty}^{\infty} f(x) \, dx = 1
\]

b. Sketch the graph of \( f(x) \). Label the axes.
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\[ f(x) = \begin{cases} 
\frac{1}{B-A} & A < x < B \\
0 & \text{otherwise} 
\end{cases} \]

c. Find the cumulative distribution \( F(x) \).

d. Sketch the graph of \( F(x) \). Label the axes.

\[ F(x) \]

\[ x \]

e. Calculate the expected value \( E(X) \) in terms of \( A \) and \( B \).

f. Calculate the variance \( V(X) \) in terms of \( A \) and \( B \).