4. [12 points] Suppose \( P(\theta) \) is the power, in kilojoules per hour (kJ/h), produced by a solar panel when the angle between the sun and the panel is \( \theta \), measured in degrees. Suppose \( C(t) \) is the power, in kJ/h, produced by the solar panel \( t \) hours after sunrise on a typical summer day. Give practical interpretations of the following.

a. [4 points] \( P'(30) = 9 \).

\[ \text{Solution:} \quad \text{If the angle between the sun and the panel changes from 30 to 31 degrees, the power output of the panel increases by about 9 kJ/h.} \]

b. [4 points] \( \int_0^2 C(t) \, dt = 270 \).

\[ \text{Solution:} \quad \text{In the two hours after sunrise on a typical summer day, the solar panel produces 270 kJ of energy.} \]

c. [4 points] \( \frac{1}{12} \int_0^{12} C(k) \, dk = 288 \).

\[ \text{Solution:} \quad \text{In the first twelve hours after sunrise on a typical summer day, the average power output of the panel is 288 kJ/h.} \]