PROBLEM:

Consider the cosine wave

$$x(t) = 10\cos(880\pi t + \phi)$$

Suppose that we obtain a sequence of numbers by sampling the waveform at equally spaced time instants nT_s. In this case the resulting sequence would have values

$$x[n] = x(nT_s) = 10\cos(880\pi nT_s + \phi) \qquad -\infty < n < \infty$$

Suppose that $T_s = 0.0001$.

(a) How many samples will be taken in one period of the cosine wave?

(b) Now consider another waveform $y(t)$ such that

$$y(t) = 10\cos(\omega_0 t + \phi)$$

Find a frequency $\omega_0 > 880\pi$ such that $y(nT_s) = x(nT_s)$ for all integers n.
Hint: Use the fact that $\cos(\theta + 2\pi n) = \cos(\theta)$ if n is an integer.

(c) For the frequency found in part (b), what is the total number of samples taken in one period of $x(t)$?