PROBLEM:

Let $x(t)$ be the signal

$$x(t) = [10 + 5\cos(2000\pi t + \pi/5)]\cos(10000\pi t).$$

(a) Use Euler's relation to expand $x(t)$ as a sum of complex exponential signals and show that it can be expressed in the Fourier series form

$$x(t) = \sum_{k=-\infty}^{\infty} a_k e^{jk\omega_0 t}$$

(b) Determine the fundamental frequency ω_0 of this signal.

(c) What is the "DC value" of this signal?

(d) Determine all of the non-zero coefficients a_k of this signal and plot the spectrum of this signal. **Note carefully that you should be able to do this without evaluating any integrals.**