Quiz 03: Material model

The properties of a metal can be described in the frequency domain by the generalized epsilon function as

$$\varepsilon(\omega) = 1 - \frac{\omega_p^2}{\omega^2 + \mathbf{i}g\omega}.$$

1) Find the real part ε'(ω) and the imaginary part ε'' (ω) of ε(ω). [4 points]
2) What is the physical meaning of the parameter g? [1 point]
3) Make a qualitative plot of ε'(ω) and ε''(ω), which should also visualize if/where the functions cross zero as well as their behavior for ω→0 and ω→∞. [3 points]
4) Define the range of frequencies ω for which the metal shows metallic behavior and specify the frequency ω_L at which is transitions from metal to dielectric. [2 points]

You have 10 minutes!

Make sure that you indicate your seminar group on your answer sheet!