American University of Beirut

Department of Electrical and Computer Engineering

EECE 310 – Electronics Fall 2011 – 2012

*Due Wednesday October 19, 2011 at 9:00 am*

**Homework 3**

**1.** **[28 points]** Consider the waveform shown below.



The waveform is superimposed on a 9 V DC level, and the total voltage is applied to a circuit consisting of a 10 k resistor and a (conducting) diode.

Assuming Vmax = 1.5 V, find the *peak-to-peak* variation in the diode voltage using small signal analysis **[10 points]**. Assume that the diode drops a voltage of 0.65 V due to the 9 V DC source alone, and that *n* = 1.7. Is small-signal analysis justified in this case **[3 points]**?

Provide a plot of the *total diode current*, as derived from DC and small-signal analyses. Label all important current levels on the graph **[15 points]**.

**2.** **[72 points]** Repeat Problem 2 in Homework 2 using the following model for the conducting diodes: *V*D0 = 0.6 V, *r*D = 20  **[4 points for the ID value per diode, 4 points for the VD value per diode]**.

**Verify using PSpice**: The diode in this case is modeled by an *ideal* diode (reduce the value of *n* to 10-6) *in series* with a 0.6 V DC battery (with the correct polarity) and a 20  resistor.

**[2 points for the ID value per diode, 2 points for the VD value per diode, shown on the PSpice schematic].**