ELE 447

Home Work 1 A

This is your first home work problem. I will also place one or two more analytical problems on the web page shortly; however, I would like you all to focus on getting your Hspice simulation running and making sense first. Please email me davis@ele.uri.edu, if you are having problems getting through any of this exercise. You can actually have a great deal of professional satisfaction and even some fun if you can get this going early in the course. It will also make Lab 1 much, much easier for you.

These are the steps:

1. Log into a linux machine. You can do this in the ele computer lab (Kelly 1st floor) or in the EGR computer lab in Kirk on the 2nd floor.
2. Open 3 terminals. In order to open a terminal, you will need to bring down the drop menu on the top left hand side of the screen; you will find it under "Accessories". Do this 3 times.
3. Place your cursor in one of the terminals and execute the following command ($ command prompt):
   $mkdir Hwk1_myname
   you have created the directory named Hwk1_myname (please replace myname with your actual name).
4. Now you will need to get into this directory; in each terminal window execute the following command:
   $cd Hwk1_myname
5. Now, download the file "invertSample.sp" and "v13j-params.bsim3v3" using the link provided under the Home Work 1 link.
6. In one of the terminals, copy these files into your present working directory:
   $cp ../Downloads/invertSample.sp .
   $cp ../Downloads/v13j-params.bsim3v3 .
   Note: the "." is NECESSARY. What you are telling the command shell is to take your files from the subdirectory Downloads and copy them into the directory you are presently in (which should be Hwk1_myname).
7. You will need an editor. If you are familiar with linux then you are free to use your favorite editor. If you are new to linux, I will suggest emacs. I use it frequently.
   $emacs invertSample.sp
   (remembering to hit the enter button after typing the command)
8. In a second terminal, type the following command:
   $hspice invertSample.sp
   hspice should run and you will see a lot of stuff going by; if you would like to make a file copy of the data going by then re-run hspice "redirecting" the output data into a file:
   $hspice invertSample.sp > invertMyName.lis
9. In the 3rd terminal window type the following command:
   $emacs invertMyname.lis &
   The "&" will give free the terminal prompt "$" allowing you to reuse the same terminal. You can view the hspice output. Scroll near the bottom of the file to find the operating point.
10. You will need to now plot the data. There is a package named cscope. The only purpose of cscope is to display your data. In the same terminal you were just using type the following command:
    $cscope &
    cscope should come up. Using your mouse find "File" and "Open" (under file). You should

ELE 447

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see 2 files: invertSample.sw0 and invertSample.tr0; these are the data files for the two types of analysis performed: DC analysis and transient analysis, respectively.

11. Open the file "invertSample.sw0" and open up an "XY" grap window. Clicking the graphical icon on the top left will also do it.
12. Try to plot v(vin), v(vout) and i(m2). You will see 3 XY graphs in the graphical window. You can drag the names (e.g. v(vout)) into a window occupied by v(vin) and overlay the graphs. Try overlaying all 3 graphs.
13. Open a new XY graph window. Open the file "invertSample.tr0". Plot v(vin) and v(vout) in the new XY graph window. Overlay the two plots.
14. Try to find the rise time and fall time of vout. You can do this by using the meausre icon (3rd from the top left) and selecting two points. The "Y-value" of one point must have 0.5 Volts and the "Y-value" of the second point must have 4.5 Volts. (the supply voltage is 5 Volts; 90% of 5 Volts is 4.5 Volts and 10% of 5 Volts is 0.5 Volts). If you perform this task once for the rising part of vout and once for the falling part of vout, then you have just measured the rise and fall times.
15. Open a new emacs editor window. Save this window as Notes.txt. Write down the values of the rise and fall time in Notes.txt.
16. If you have gone this far, then try to use a new W value for M1. The present W value is given as 6 (e.g. W=6); change it to "W=10".
17. Run hspice again (without a .lis output).
18. Measure the new rise and fall time. Record the new values in Notes.txt.
19. Save your directory in a compressed format when you are finished. In one of the terminal windows, type the following commands:
    $cd ..
    this brings you back above Hwk1_myname
    $ tar czvf Hwk1_myname.tgz Hwk1_myname
    you should see the directory compressing. Check your directory:
    $ls *.tgz
    you should see the file, Hwk1_myname.tgz
20. Check to see that the file compressed properly:
    $mkdir junk
    $cp Hwk1_myname.tgz junk
    $cd junk
    $tar xvf Hwk1_myname.tgz
    $cd Hwk1_myname.tgz
    $ls -l
    you should see all of your files in this subdirectory.
21. Email me the file Hwk1_myname.tgz

That's it. Although these are many steps, you should be able to get through this relatively quick. If not then email me. You can also ask about it in class on Monday. Even if you try to do this and you cannot complete the task, you will find that any advice will be much more helpful.

Good luck.