

# Dr. Baker's HW Template

## Homework guidelines

- \* Homework is due at the beginning of the lecture. Please don't work on your homework while I'm lecturing (even if you are trying to follow the rules below and make it "pretty").
- \* Only use one side of a sheet of paper (8.5 by 11 inches).
- \* Turn homework in folded length-wise (not width-wise) with your name and HW# on the top outside of the HW. No "landscape" type solutions or work. The HW should open like a book with the binding (fold) on left and your name visible at the top when the solutions are closed (folded) and the fold is on the left.
- \* The homework problem number/statement/question should be placed before the solution
- \* Simulation results should always follow, and be integrated with, a problem's solution
- \* When possible put a box around your answers.
- \* Simulation results should *never* be tacked on to the end of the homework set (you will lose points!)
- \* A simulation plot should *never* occupy one whole page (place simulation results in a word document so they are oriented in the same direction as the hand calculations, that is, not landscape). Reduce the size of the plots so, say, 4 or 6 plots could be placed on one sheet of paper. If you only have one plot for a problem's solution then place/write your hand calculations on the same sheet as the SPICE results (this plot) to minimize paper usage.
- \* Simulation results should always have either hand written or computer generated indications (arrows, labels, comments, etc) on them so it's easy to see what's being shown (read this one again, using a pencil/pen and writing on the plot to indicate what's going on is encouraged!).
- \* Staple your homework together in the top left corner (only) when the HW is "opened." If a staple won't make it through your thick assignment then you need to redo the assignment and make things clearer and simpler (and thus use fewer sheets of paper). Again, only one side should be used.
- \* Do not use one whole sheet of paper, a cover sheet, for your name and the homework number. These can be included on top of the page containing your first solution.

James Skelly  
EE 220  
HW #7

Header including  
name and homework  
number at the **top** of  
the outer cover.



**Folded length-wise.**  
Homework opens like a  
book with the "binding"  
(fold) on the left.

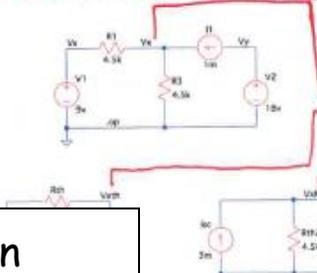
Staple in top left corner.

Question written out above problem solution.

14/14

1. Find the Thevenin and Norton equivalent circuits between  $V_x$  and ground with  $R_2$  removed. Show that when you connect  $R_2$  to the equivalents that you get the same value for  $V_x$ . Verify using LTSpice.

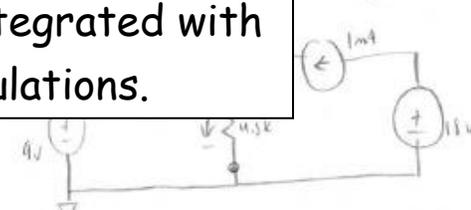
(A.)



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Direct Newton iteration for .op point succeeded.
Operating Point Solution:
V(x)      3 voltage
V(y)      18 voltage
V(x)      6.75 voltage
V(x)      13.5 voltage
V(x)      6.75 voltage
V(x)      6.75 voltage
V(x)      -6.75 voltage
I(I1)     8.001 device_current
I(I2)     8.001 device_current
I(I3)     8.001 device_current
I(I4)     8.001 device_current
I(I5)     8.001 device_current
I(I6)     8.001 device_current
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I(I97)    8.001 device_current
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I(I99)    8.001 device_current
I(I100)   8.001 device_current
    
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LTSpice simulation results integrated with hand calculations.

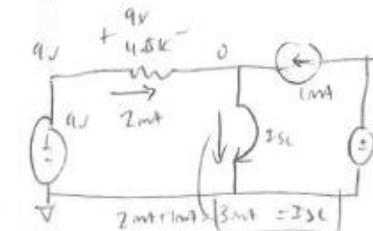
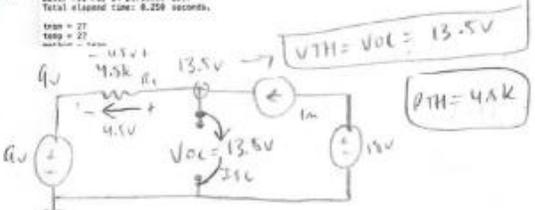


$$\frac{V_x - 9V}{4.5k} + \frac{V_x}{4.5k} = 1mA$$

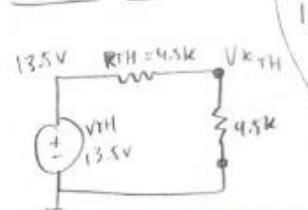
$$2V_x - 9V = 4.5V$$

$$2V_x = 13.5V$$

$$V_x = 6.75V$$



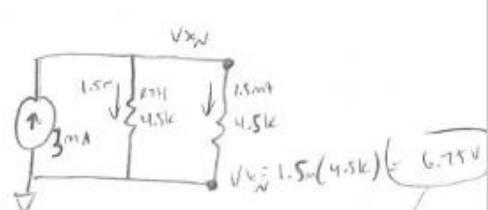
Thevenin circuit



$$13.5 \times \frac{4.5}{4.5 + 4.5} = V_{xTH}$$

$$V_{xTH} = 6.75V$$

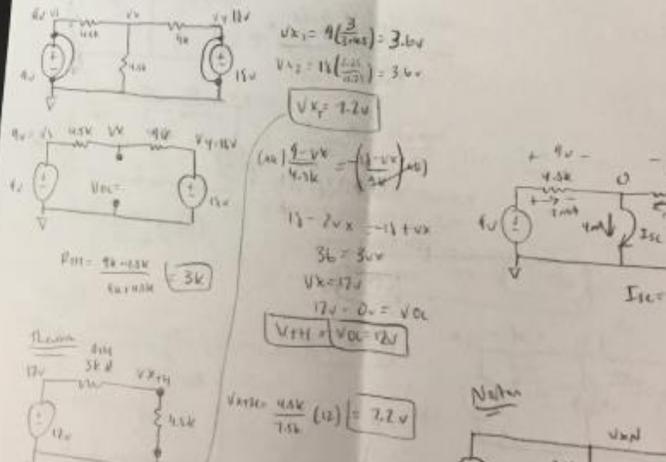
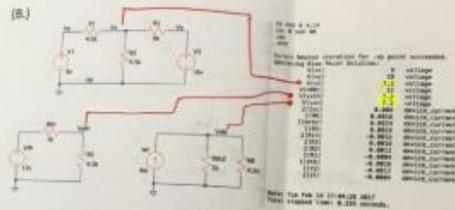
Norton circuit



$V_x = 6.75V$   
 $V_{xTH} = 6.75V$   
 $V_{xN} = 6.75V$

Answers boxed.

Back of page is BLANK. Do not use the back side of a page that is filled with work.



# Extra Tips

- If you have a Windows computer, use the "Snipping Tool" to take guided screenshots of your work on LTSpice.
- If you have a MAC computer, use the "Grab Tool" to take guided screenshots of your work on LTSpice.
- Next page shows LTSpice shortcuts for MAC users.

# LTSPICE SHORTCUTS ON A MAC

11/5/2013 REV 3

a		DRAW CIRCLE
b		BUS TERMINATION
g		GROUND
l		DRAW LINE
s		ADD SPICE DIRECTIVE (right click for HELP ME EDIT)
t		ADD TEXT COMMENT
w		DRAW BOX

⌘	H	HIDE LTSPICE
⌘	L	SPICE LOG
⌘	N	NEW SCHEMATIC
⌘	O	OPEN
⌘	Q	QUIT LTSPICE
⌘	S	SAVE
⌘	Z	UNDO
⇧⌘	Z	REDO
⌘	M	MINIMIZE
⌘	M	MINIMIZE ALL
⌘	W	CLOSE
⌘	W	CLOSE ALL
⌘	P	PRINT
⇧⌘	P	page seupt

F2	COMPONENT
F3	WIRE
F4	NET NAME
F5	DELETE
F6	DUPLICATE
F7	MOVE (CNTRL-R to rotate, CNTRL-E to mirror)
F8	DRAG (CNTRL-R to rotate, CNTRL-E to mirror)
F9	UNDO
⇧F9	REDO

SPACE BAR	ZOOM TO FIT
2 FINGER PINCH	ZOOM IN
2 FINGER SPREAD	ZOOM OUT

Here are the modifier key symbols you may see in OS X menus:

⌘	COMMAND
⌥	ALT OR OPTION
⇧	SHIFT