1a. $V_{OC} = (12V)\frac{6\Omega}{3+6\Omega} = 8V$. $R_{EQ} = 3||6+7 = 9\Omega$. $I_{SC} = \frac{8V}{9\Omega} = \frac{8}{9}A$.
$V_{THEV} = 8V$. $R_{THEV} = 9\Omega$. $I_{NORTON} = \frac{8}{9}A$. $R_{NORTON} = 9\Omega$.
EASY, ALTHOUGH SOME DID IT THE HARD WAY (DIDN'T RECOGNIZE VOLTAGE DIVIDER)

1b. Node eqn. for $V_{OC}$: $\frac{V_x-4}{2k\Omega} = \frac{V_x}{4k\Omega} \rightarrow V_{OC} = V_x = 8V$.
$I_{SC} = \frac{4V}{2k+3k\Omega} = 0.8mA$ since $V_x = 0$. $R_{EQ} = \frac{8V}{0.8mA} = 10k\Omega$.
$V_{THEV} = 8V$. $R_{THEV} = 10k\Omega$. $I_{NORT} = 0.8mA$. $R_{NORT} = 10k$

1c. Replace each Norton eq. with its Thevenin eq. and add in series:
$V_{OC} = [(\frac{1}{3}A)(3\Omega)] - [(2A)(4\Omega)] = -7V$. $R_{TH} = 4+3+5 = 12\Omega$.
$V_{THEV} = -7V$. $R_{THEV} = 12\Omega$. $I_{NORT} = -\frac{7}{12}A$. $R_{NORT} = 12\Omega$
WRONG SIGN = (-1) (I PUT THEVENIN FIGURE ON BOARD). 1+8=9 INSTEAD OF 1-8=-7 = (-2)

2a. Noninverting amp$\rightarrow \frac{V_{OUT}}{V_{IN}} = 1 + \frac{R_F}{R_1}$ from handout or text.
A FEW THOUGHT THIS WAS INVERTING AMPLIFIER (U&H).

2b. $I_+ = 0 \rightarrow V_+ = V_{OUT}\frac{80}{80+10} = \frac{8}{9}V_{OUT}$.
$\frac{V_{IN}-V_-}{10k\Omega} = \frac{V_- - V_{OUT}}{80k\Omega} \rightarrow V_- = \frac{8}{9}V_{IN} + \frac{1}{9}V_{OUT} \rightarrow \frac{V_{OUT}}{V_{IN}} = \frac{8}{7}$.
HARDEST PROBLEM. SOME INGENIOUS OTHER WAYS.

2c. $V_A = V_- = V_+ = 0 \rightarrow \frac{V_{OUT}}{V_{IN}} = -\frac{10k\Omega}{1k\Omega} = -10$ (inverting amp).
YOU HAD TO NOTE SPECIFICALLY AND EXPLICITLY THAT $V_A = 0$ OR (-5) = VOUT IS NOT A NODE VOLTAGE

3a. $t = 0^-$: inductor$\rightarrow$short$\rightarrow V_L = 0$; capacitor$\rightarrow$open$\rightarrow I_C = 0$.
$I_L = \frac{10V}{100+400\Omega} = 20mA$. $V_C = (10V)\frac{400}{400+100} = 8V$.

3a. $t = 0^+$: $I_L = 20mA$. $V_C = 8V$ (these can't jump at $t = 0$).
$I_C = -20mA$. $V_L = V_C - 400I_L = 8 - 400(20mA) = 0$ (coincidence).
HERE WRONG SIGN WAS OK, SINCE I DIDN'T SPECIFY DIRECTION. YOU HAD TO SHOW THIS EXPLICITLY, OR NO CREDIT

3b. Max. power transfer$\rightarrow R = 100\Omega \rightarrow$Power$=\frac{(10V)^2}{4(100\Omega)} = \frac{1}{4}Watt$.
DON'T ASK FOR REGRADES ON THIS POINT - I'LL BE FIR

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|---|---|
| 99 | 70 |
| 98 | 70 |
| 97 | 70 |
| 95 | 67 |
| 94 | 65 |
| 93 | 65 |
| 91 | 62 |
| 90 | 62 |
| 90 | 62 |
| 90 | 60 |
| 90 | 60 |
| 89 | 60 |
| 88 | 60 |
| 86 | 58 |
| 86 | 57 |
| 85 | 56 |
| 85 | 53 |
| 85 | 52 |
| 85 | 51 |
| 83 | 47 |
| 82 | 45 |
| 80 | 44 |
| 79 | 43 |
| 77 | 41 |
| 75 | 37 |
| 75 | 35 |
| 75 | 28 |

MEDIAN 70-75