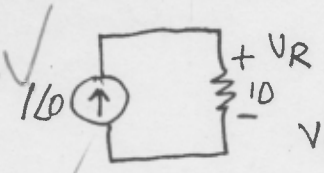
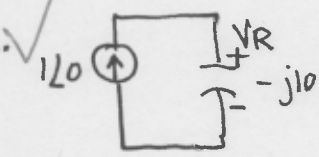
EE 210 EXAM STUDENT NAME Bryan Tuttle

85 + 15 = 100

$V = IR$ =

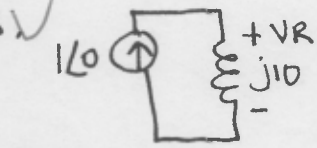
1. 

V_R = (a) $\frac{1}{10}\angle 0$, (b) $10\angle 90$, (c) $10\angle 0$, (d) $\frac{1}{10}\angle 45$, (e) $\frac{1}{10}\angle -45$

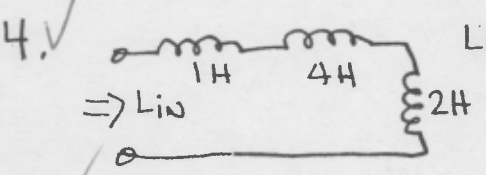
2. 

$(1\angle 0)(10\angle -90) = 10\angle -90$

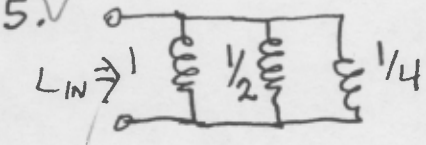
V_R = (a) $\frac{1}{10}\angle 90$, (b) $10\angle -90$, (c) $10\angle 90$, (d) $10\angle 45$, (e) $\frac{1}{10}\angle -90$

3. 

V_R = (a) $\frac{1}{10}\angle -90$, (b) $10\angle -90$, (c) $10\angle 90$, (d) $10\angle 45$, (e) $\frac{1}{10}\angle 90$

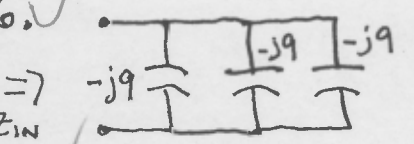
4. 

L_{IN} = (a) $\frac{1}{6}$ H, (b) $\frac{1}{7}$ H, (c) 7H, (d) 0.5H, (e) 0.25 H

5. 

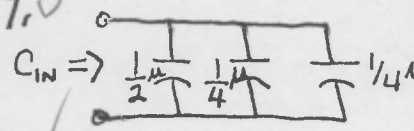
L_{IN} = (a) 1.75 H, (b) 7H, (c) $\frac{1}{6}$ H, (d) 6H, (e) $\frac{1}{7}$ H

$(1+2+4)^{-1} = \frac{1}{7}$ H

X 6. 

Z_{IN} = (a) $-27j$ (b) $3\angle -90$ (c) $\frac{1}{3}\angle -90$ (d) $3j$ (e) $27\angle +90$

$(-j\frac{3}{9})^{-1} = 3j$

7. 

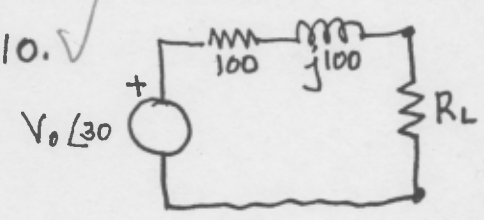
C_{IN} = (a) $\frac{1}{10}$ M (b) 10μ (c) $\frac{1}{4}$ M (d) $\frac{1}{2}$ M (e) 1M

8. $V(t) = V_0 \cos 4\pi t$ f = (a) 4π (b) 4 (c) 2 (d) ¼ (e) ½ Hz

$\omega = 2\pi f$ $4\pi = 2\pi f$ $f = 2$

9. $V(t) = V_0 \cos 4\pi t$ T = (a) 4π (b) 4 (c) 2 (d) ¼ (e) ½ sec

$\omega t = 2\pi$

10. 

$Z_{eq} = 100 + 100j$

$\sqrt{100^2 + 100^2}$

WHAT VALUE of R_L results in the maximum power delivered to R_L?

(a) 100

(b) $100\sqrt{2}$

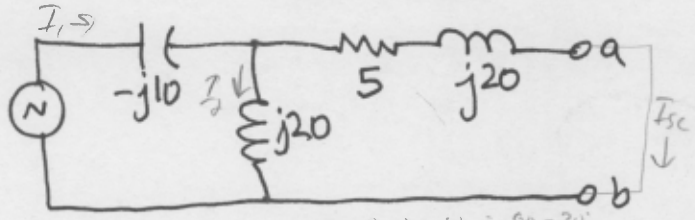
(c) -100

(d) $-j100$

(e) 50

NAME Bryan Tilt

11. ✓

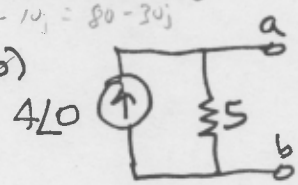


Which of the equivalent circuits shown below is the equivalent of the circuit to the left?

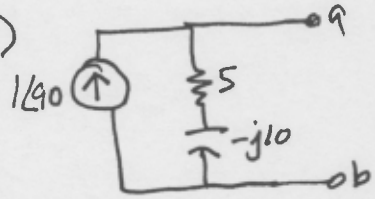
$80 - 20j - 10j = 80 - 30j$

(a)

(b)



(c)

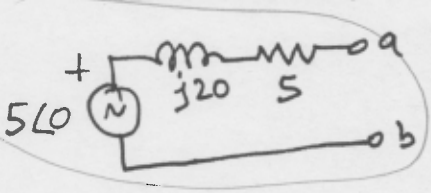


$\left(\frac{1}{-j10} + \frac{1}{j20}\right)^{-1}$

$\frac{2}{20}j - \frac{1}{20}j$

$\frac{1}{10}j = 10\angle 90$

(d)



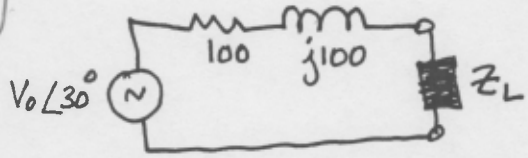
$Z_1 = Z_{eq} = -10j$ $\quad I_{sc} = I_1 - I_2$

$I_{sc} = \frac{10\angle 0}{10\angle 90} - \left(\frac{\quad}{5+j10}\right)(1\angle 90)$

$\frac{120}{5+j10}(1\angle 90)$

$\frac{5\sqrt{17}\angle 76}{\sqrt{125}\angle 63}(1\angle 90)$

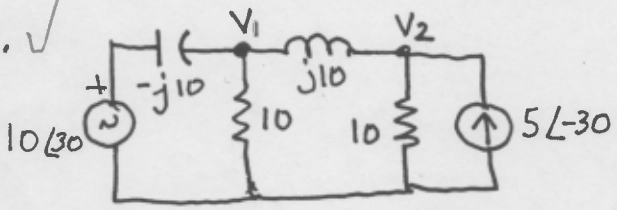
12. ✓



WHAT VALUE of Z_L results in the maximum power delivered to Z_L?

(a) 100 (b) j100 (c) 100+j100 (d) -j100 (e) 100-j100

13. ✓



Which of the following is the correct form of the node voltage equations for V_1 and V_2?

(a) $\frac{V_1 - 10\angle 30}{10} + \frac{V_1}{-j10} + \frac{V_1 - V_2}{j10} = 0$

$\frac{V_2 - V_1}{j10} + \frac{V_2}{10} = 5\angle -30$

(b) $\frac{V_1 - 10\angle 30}{-j10} + \frac{V_1}{10} + \frac{V_1 - V_2}{j10} = 0$

$\frac{V_2 - V_1}{j10} + \frac{V_2}{10} + 5\angle -30 = 0$

(c) $\frac{V_1 - 10\angle 30}{-j10} + \frac{V_1}{10} + \frac{V_1 - V_2}{j10} = 0$

$\frac{V_2 - V_1}{j10} + \frac{V_2}{10} - 5\angle -30 = 0$

(d) $\frac{V_1 + 10\angle 30}{-10j} + \frac{V_1}{10} + \frac{V_1 - V_2}{j10} = 0$

$\frac{V_2 - V_1}{j10} + \frac{V_2}{10} + 5\angle -30 = 0$

(e) $\frac{V_1 - 10\angle 30}{j10} + \frac{V_1}{10} + \frac{V_1 - V_2}{j10} = 0$

$\frac{V_2 - V_1}{j10} + \frac{V_2}{10} - 5\angle -30 = 0$

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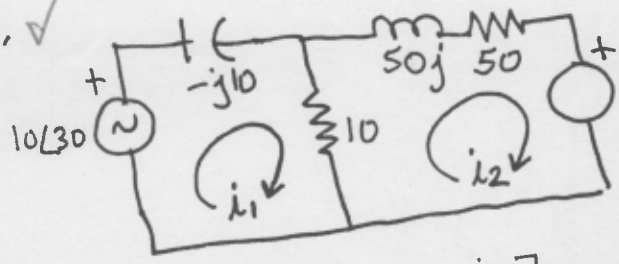
14. 

WHICH of the following is the correct form of the mesh current equations?

(a) $-10\angle 30 + i_1[-j10] + [i_1 - i_2]10 = 0$ ✓
$10(i_1 - i_2) + i_2(50+50j) + 10\angle 30 = 0$ ×

(b) $-10\angle 30 - i_1[j10] + [i_1 - i_2] = 0$ ×
$10\angle 30 - i_2(50+50j) + (i_2 - i_1)10 = 0$

(c) $10\angle 30 + i_1[-j10) + [i_2 - i_1]10 = 0$
$10\angle 30 + i_2(50+50j) + 10(i_2 - i_1) = 0$

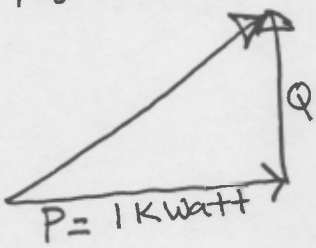
(d) $10\angle 30 + i_1(j10) + 10(i_2 - i_1) = 0$ ✓
$10\angle 30 + i_2(50+50j) + 10(i_2 - i_1) = 0$

(d) $-10\angle 30 + i_1[-j10] + [i_1 - i_2]10 = 0$ ✓
$(i_2 - i_1)10 + i_2(50+50j) = 10\angle 30$ ×

15. Current (a) leads, (b) lags, (c) in phase with voltage in a capacitive circuit.

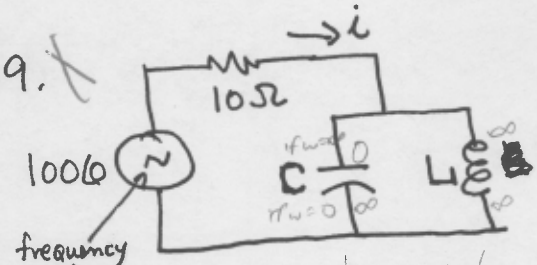
16. Current (a) leads, (b) lags, (c) in phase with voltage in an inductive circuit.

17. Current (a) leads, (b) lags, (c) in phase with voltage in a resistive circuit.

18. 

$v = V_0 \cos(\omega t + 15^\circ)$
$i = I_0 \cos(\omega t + \theta)$ WHAT IS θ?

(a) $\theta = 45^\circ$ (b) $\theta = 60^\circ$ (c) $\theta = -45^\circ$
(d) $\theta = -30^\circ$ (e) $\theta = -15^\circ$

19. 

For what value of ω is $i = 0$

(a) $\omega = 0$, (b) $\omega = LC$ (c) $\omega = \frac{1}{LC}$
(d) $\omega = \frac{1}{[LC]^{1/2}}$ (e) $\omega = \infty$

20. RMS of $V(t)$ = ?

(a) $\left\{\frac{1}{T}\int_0^T V(t)\,dt\right\}^{1/2}$ (b) $\left\{\frac{1}{T}\int_0^T V^2(t)\,dt\right\}^{1/2}$ (c) $\left\{\frac{2}{T}\int_0^{T/2} V^2(t)\,dt\right\}$

(d) $\left\{\frac{1}{T}\int_0^T V^{1/2}\,dt\right\}^2$ (e) $\left\{\frac{1}{T}\int_0^T V^3\,dt\right\}^{1/2}$