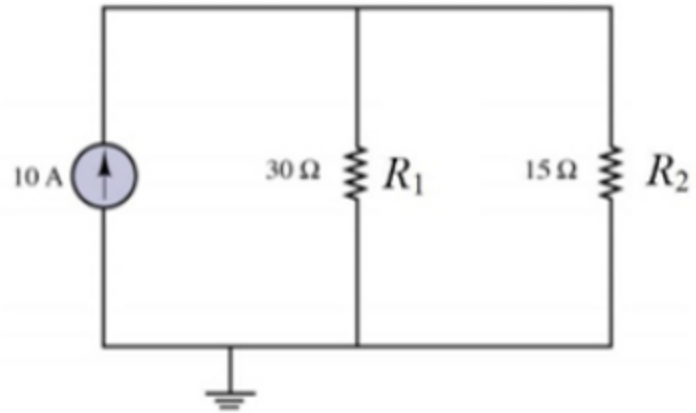
Question 1

3 pts

Find the power consumed by resistors R_1 and R_2.

Find the power consumed by resistors R_1 and R_2.



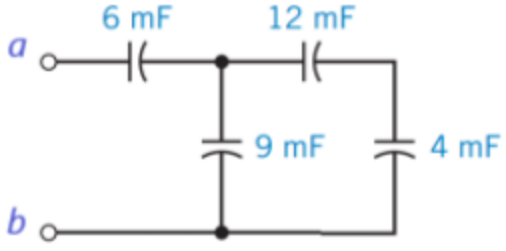
Note: Two versions will be given to avoid misunderstandings, the text version (black) and the image version (blue). If the two contents conflict, please refer to the image version first.

Question 2

3 pts

For the four capacitors connected as shown on the following circuit, find the equivalent capacitance C_{ab}.

For the four capacitors connected as shown on the following circuit, find the equivalent capacitance C_{ab}.



Note: Two versions will be given to avoid misunderstandings, the text version (black) and the image version (blue). If the two contents conflict, please refer to the image version first.

- ○ 4 mF

  $4\ \text{mF}$

- ○ 31 mF

  $31\ \text{mF}$

- ○ 54/33 mF

  $\frac{54}{33}\ \text{mF}$

- ○ 78/7 mF

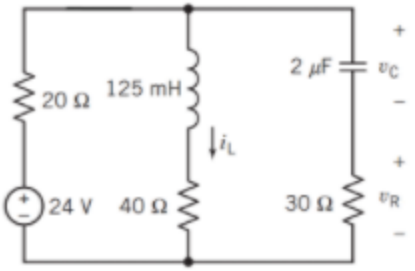
  $\frac{78}{7}\ \text{mF}$

Question 3

3 pts

Under the dc condition, find i_L, v_C, and v_R in the following circuit.

Under the dc condition, find i_L, v_C, and v_R in the following circuit.



Note: Two versions will be given to avoid misunderstandings, the text version (black) and the image version (blue). If the two contents conflict, please refer to the image version first.

- ○ i_L=0.4 A, v_C=0 V, and v_R=0 V

  $i_L = 0.4\ \text{A},\ v_C = 0\ \text{V},\ and\ v_R = 0\ \text{V}$

- ○ i_L=0 A, v_C=0 V, and v_R=14.4 V

  $i_L = 0\ \text{A},\ v_C = 0\ \text{V},\ and\ v_R = 14.4\ \text{V}$

- ○ i_L=0.4 A, v_C=16 V, and v_R=0 V

  $i_L = 0.4\ \text{A},\ v_C = 16\ \text{V},\ and\ v_R = 0\ \text{V}$

- ○ i_L=0 A, v_C=0 V, and v_R=0 V

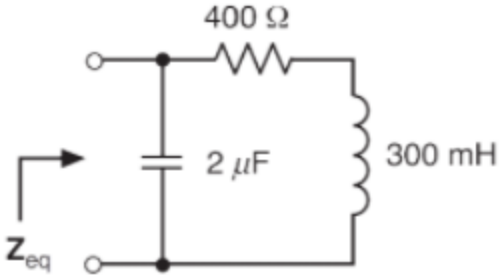
  $i_L = 0\ \text{A},\ v_C = 0\ \text{V},\ and\ v_R = 0\ \text{V}$

Question 4

3 pts

Determine the equivalent impedance Z_{eq} of the following circuit at the frequency $\omega = 1000$ rad/s.

Determine the equivalent impedance Z_{eq} of the following circuit at the frequency $\omega = 1000$ rad/s.



Note: Two versions will be given to avoid misunderstandings, the text version (black) and the image version (blue). If the two contents conflict, please refer to the image version first.

- ○ 599∠-26.5° Ω

  $599\angle -26.5° \ \Omega$

- ○ 0.0018∠26.5° Ω

  $0.0018\angle 26.5° \ \Omega$

- ○ 0.0018∠-26.5° Ω

  $0.0018\angle -26.5° \ \Omega$

- ○ 599∠26.5° Ω

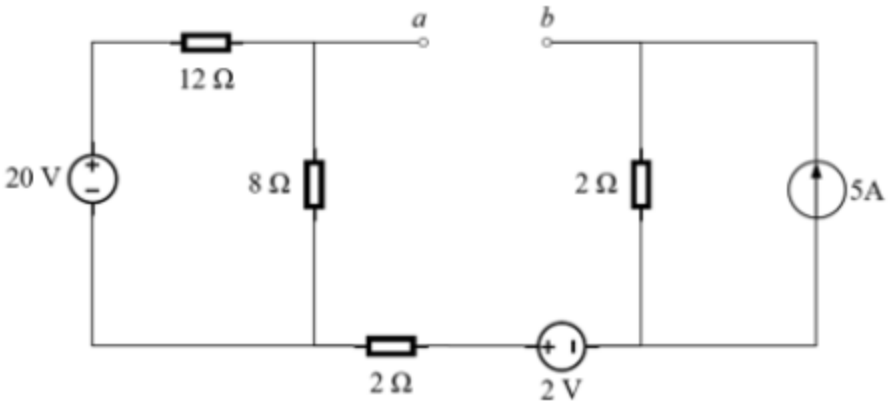
  $599\angle 26.5° \ \Omega$

Question 5

3 pts

Find the Thevenin equivalent with respect to terminals *a*-*b* in the following circuit.

Find the Thevenin equivalent with respect to terminals *a*-*b* in the following circuit.



Note: Two versions will be given to avoid misunderstandings, the text version (black) and the image version (blue). If the two contents conflict, please refer to the image version first.

- ○ R_{th} = 4.8 Ω, U_{ab} = 20 V

  $R_{th} = 4.8\ \Omega,\ U_{ab} = 20\ \text{V}$

- ○ R_{th} = 8.8 Ω, U_{ab} = 20 V

  $R_{th} = 8.8\ \Omega,\ U_{ab} = 20\ \text{V}$

- ○ R_{th} = 4.8 Ω, U_{ab} = 0 V

  $R_{th} = 4.8\ \Omega,\ U_{ab} = 0\ \text{V}$

- ○ R_{th} = 8.8 Ω, U_{ab} = 0 V

  $R_{th} = 8.8\ \Omega,\ U_{ab} = 0\ \text{V}$

Question 6

3 pts

If $y = x^6 \sin(1/x)$, find the derivative of y.

$$\text{If } y = x^6 \sin(1/x), \text{ find the derivative of y.}$$

Note: Two versions will be given to avoid misunderstandings, the text version (black) and the image version (blue). If the two contents conflict, please refer to the image version first.

- ○ $x^5 \sin(1/x) - x^4 \cos(1/x)$

  $$x^5 \sin(1/x) - x^4 \cos(1/x)$$

- ○ $5x^5 \sin(1/x) + x^4 \cos(1/x)$

  $$5x^5 \sin(1/x) + x^4 \cos(1/x)$$

- ○ $6x^5 \sin(1/x) - x^4 \cos(1/x)$

  $$6x^5 \sin(1/x) - x^4 \cos(1/x)$$

- ○ $5x^5 \sin(1/x) - x^4 \cos(1/x)$

  $$5x^5 \sin(1/x) - x^4 \cos(1/x)$$

Question 7

3 pts

If tan $\alpha = 3/4$, find $\cos^2\alpha + 2\sin 2\alpha$.

If tan $\alpha = 3/4$, find $\cos^2\alpha + 2\sin 2\alpha$.

Note: Two versions will be given to avoid misunderstandings, the text version (black) and the image version (blue). If the two contents conflict, please refer to the image version first.

- ○ 48/25

  48/25

- ○ 16/25

  16/25

- ○ 1

  1

- ○ 64/25

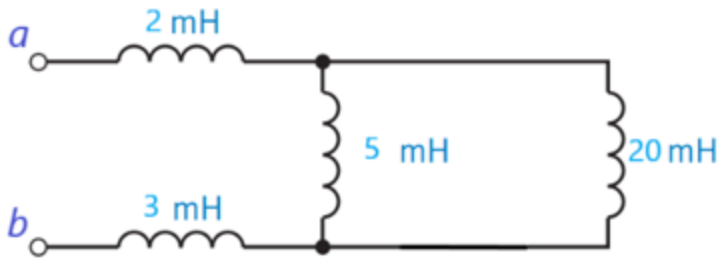
  64/25

Question 8

3 pts

For the four inductors connected in the following circuit, find the equivalent inductance L_{ab}.

For the four inductors connected in the following circuit, find the equivalent inductance L_{ab}.



Note: Two versions will be given to avoid misunderstandings, the text version (black) and the image version (blue). If the two contents conflict, please refer to the image version first.

- ○ 150/131 mH

150/131 mH

- ○ 30 mH

30 mH

- ○ 9 mH

9 mH

- ○ 12/13 mH

12/13 mH

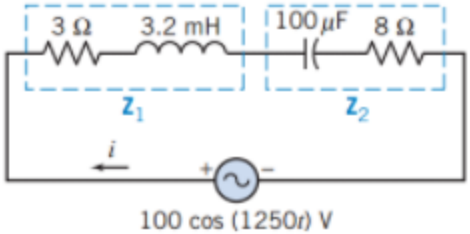
Question 9

3 pts

In the following circuit, the impedances are given by $Z_1=5\angle 51.3°\ \Omega$ and $Z_2=8\sqrt{2}\angle -45°\ \Omega$. Find the current $i(t)$.

In the following circuit, the impedances are given by $Z_1 = 5\angle 51.3°\ \Omega$ and $Z_2 = 8\sqrt{2}\angle -45°\ \Omega$.

Find the current $i(t)$.



Note: Two versions will be given to avoid misunderstandings, the text version (black) and the image version (blue). If the two contents conflict, please refer to the image version first.

- ○ $i(t)=8.55cos(1250t+20°)$ A

  $$i(t) = 8.55\cos(1250t + 20°)\ \text{A}$$

- ○ $i(t)=8.55cos(1250t-20°)$ A

  $$i(t) = 8.55\cos(1250t - 20°)\ \text{A}$$

- ○ $i(t)=8.55cos(1250t-70°)$ A

  $$i(t) = 8.55\cos(1250t - 70°)\ \text{A}$$

- ○ $i(t)=8.55cos(1250t-110°)$ A

  $$i(t) = 8.55\cos(1250t - 110°)\ \text{A}$$

Question 10

3 pts

If $(z - j)\, j = 2 + j$, find z.

If $(z - j)\, j = 2 + j$, find z.

Note: Two versions will be given to avoid misunderstandings, the text version (black) and the image version (blue). If the two contents conflict, please refer to the image version first.

- ○ $2 + j$

  $2 + j$

- ○ $1 + j$

  $1 + j$

- ○ $1 - j$

  $1 - j$

- ○ $2 - j$

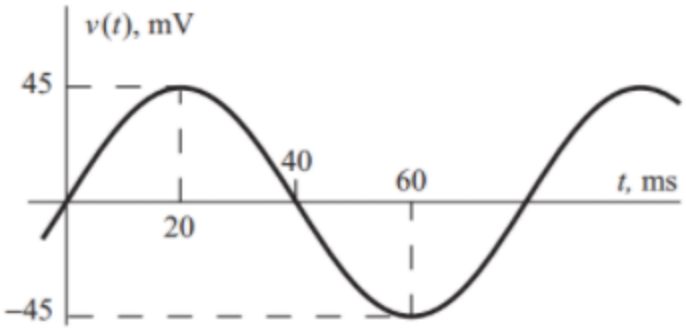
  $2 - j$

Question 11

3 pts

Express the voltage in the following figure in the general form $v(t)=A\cos(\omega t+\phi)$ V where $A\geq 0$ and $-180°<\varphi\leq 180°$.

Express the voltage in the following figure in the general form $v(t) = A\cos(\omega t + \phi)\, V$ where $A \geq 0$ and $-180° < \varphi \leq 180°$.



Note: Two versions will be given to avoid misunderstandings, the text version (black) and the image version (blue). If the two contents conflict, please refer to the image version first.

- ○ $v(t)=0.045\cos(12.5t-90°)$ V

  $v(t) = 0.045\cos(12.5t - 90°)$ V

- ○ $v(t)=0.045\cos(25\pi t+90°)$ V

  $v(t) = 0.045\cos(25\pi t + 90°)$ V

- ○ $v(t)=0.045\cos(25\pi t-90°)$ V

  $v(t) = 0.045\cos(25\pi t - 90°)$ V

- ○ $v(t)=0.045\cos(12.5t+90°)$ V

  $v(t) = 0.045\cos(12.5t + 90°)$ V

Question 12

3 pts

Determine the capacitance of a capacitor when the voltage across it is $v(t)=12cos(500t-45°)$ **V** and the current is $i(t)=3cos(500t+45°)$ **mA**.

Determine the capacitance of a capacitor when the voltage across it is $v(t) = 12\cos(500t - 45°)$ **V**

and the current is $i(t) = 3\cos(500t + 45°)$ **mA**.

Note: Two versions will be given to avoid misunderstandings, the text version (black) and the image version (blue). If the two contents conflict, please refer to the image version first.

- ○ C=0.5 mF

  $C = 0.5\ \text{mF}$

- ○ C=0.5 uF

  $C = 0.5\ \text{uF}$

- ○ C=8 mF

  $C = 8\ \text{mF}$

- ○ C=8 F

  $C = 8\ \text{F}$

Question 13

3 pts

Evaluate $\int xe^{x^2}dx$

Evaluate $\int xe^{x^2}dx$

Note: Two versions will be given to avoid misunderstandings, the text version (black) and the image version (blue). If the two contents conflict, please refer to the image version first.

- ○ $x^2e^x + c$

  $x^2e^x + c$

- ○ $\frac{1}{2}e^{x^2} + c$

  $\frac{1}{2}e^{x^2} + c$

- ○ $e^{x^2} + c$

  $e^{x^2} + c$

- ○ $2e^{x^2} + c$

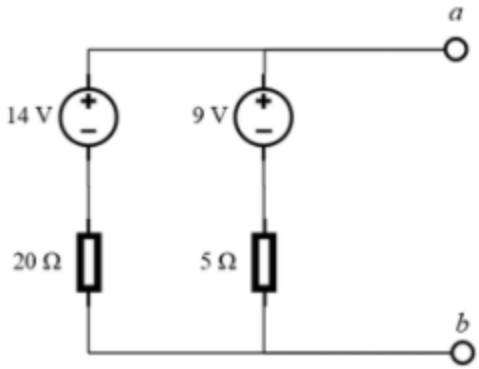
  $2e^{x^2} + c$

Question 14

3 pts

Find the Norton equivalent with respect to terminals *a*-*b* in the following circuit.

Find the Norton equivalent with respect to terminals *a*-*b* in the following circuit.



Note: Two versions will be given to avoid misunderstandings, the text version (black) and the image version (blue). If the two contents conflict, please refer to the image version first.

- ○ R_N = 0.25 Ω, I_N=1.06 A

  $R_N = 0.25\ \Omega$, I_N=1.06 A

- ○ R_N = 4 Ω, I_N=1.06 A

  $R_N = 4\ \Omega$, I_N=1.06 A

- ○ R_N = 4 Ω, I_N=2.5 A

  $R_N = 4\ \Omega$, I_N=2.5 A

- ○ R_N = 0.25 Ω, I_N=2.5 A

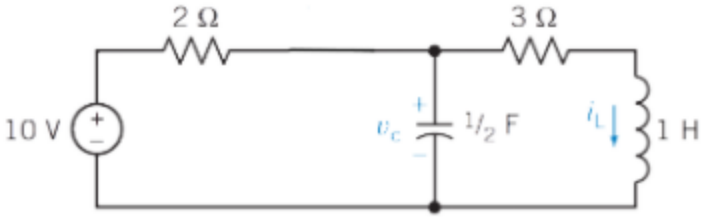
  $R_N = 0.25\ \Omega$, I_N=2.5 A

Question 15

3 pts

Under steady-state dc conditions, find i_L and v_c of the following circuit.

Under steady-state dc conditions, find i_L and v_c of the following circuit.



Note: Two versions will be given to avoid misunderstandings, the text version (black) and the image version (blue). If the two contents conflict, please refer to the image version first.

- ○ i_L=2 A, v_c=6 V

  $i_L = 2\ \text{A}, v_c = 6\ \text{V}$

- ○ i_L=3.33 A, v_c=4 V

  $i_L = 3.33\ \text{A}, v_c = 4\ \text{V}$

- ○ i_L=1.33 A, v_c=4 V

  $i_L = 1.33\ \text{A}, v_c = 4\ \text{V}$

- ○ i_L=1.33 A, v_c=6 V

  $i_L = 1.33\ \text{A}, v_c = 6\ \text{V}$

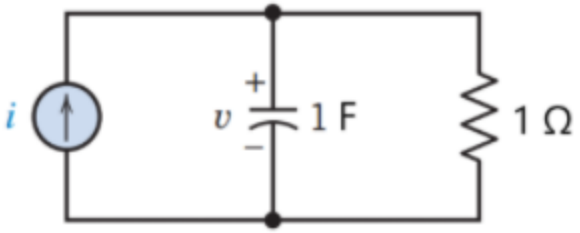
Question 16

3 pts

Find i for the following circuit if $v = 5(1 - 2e^{-2t})$ V.

[Hint: You may use the KCL to solve the problem.]

Find i for the following circuit if $v = 5(1 - 2e^{-2t})$ V.
[Hint: You may use the KCL to solve the problem.]



Note: Two versions will be given to avoid misunderstandings, the text version (black) and the image version (blue). If the two contents conflict, please refer to the image version first.

- ○ $20e^{-2t}$ A

  $20e^{-2t}$ A

- ○ $5 - 10e^{-2t}$ A

  $5 - 10e^{-2t}$ A

- ○ $5 - 30e^{-2t}$ A

  $5 - 30e^{-2t}$ A

- ○ $5 + 10e^{-2t}$ A

  $5 + 10e^{-2t}$ A