

EXAMPLES OF HANDWRITTEN AND TYPED HOMEWORK SOLUTION RECOGNITIONS

The following example shows that the responses of GPT-4o include incorrect information when asked to extract the information from a handwritten homework solution¹ and print it literally. This implies that we cannot use images of student handwritten solutions as direct inputs to GPT-4o for homework assessments and feedback.

Note: For the responses of GPT-4o, we mark the incorrect parts with a red background and the dubious contents with a yellow background. In addition, we mark with the green background the response segments that we would like to highlight as correct.

 User

① Short Circuit V_2 :

$$V_1(\omega) = 12\angle 0^\circ \text{ V} \quad Z_R(\omega) = 300\Omega, \quad Z_L(\omega) = j250\Omega, \quad Z_C(\omega) = -j400\Omega$$

Apply KVL: $-12\angle 0^\circ - (j250 + 300 - j400) I_1 = 0$

$$I_1 = -\frac{12\angle 0^\circ}{300 - j150}$$

$$= \frac{12\angle 0^\circ}{335.41\angle -26.565^\circ} = -0.0358\angle 26.565^\circ \text{ A}$$

$$= 0.0358\angle 206.56^\circ \text{ A} = 0.0358\angle -153.44^\circ \text{ A}$$

$$\rightarrow i_1(t) = 0.0358 \cos(2500t - 153.44^\circ) \text{ A}$$

② Short Circuit V_1

$$V_2(\omega) = 12\angle 0^\circ \text{ V}, \quad Z_R(\omega) = 300\Omega, \quad Z_L(\omega) = j400\Omega, \quad Z_C(\omega) = -j250\Omega$$


Apply KVL: $-12\angle 0^\circ + (j400 + 300 - j250) I_2 = 0$

$$I_2 = \frac{12\angle 0^\circ}{j400 + 300 - j250} = \frac{12\angle 0^\circ}{300 + j150} = 0.0358\angle -26.56^\circ \text{ A}$$

$$\rightarrow i_2(t) = 0.0358 \cos(4000t - 26.56^\circ) \text{ A}$$

Final Answer: $i(t) = i_1(t) + i_2(t) = [35.8 \cos(2500t - 153.44^\circ) + 35.8 \cos(4000t - 26.56^\circ)] \text{ mA}$

Can you extract the information in the attached image and print it literally in the response? If you encounter equations, you may use LaTeX.

GPT-4o 

Sure, here is the extracted information from the image:

① Short Circuit V_2 :

$$V_1(j\omega) = 12\angle 0^\circ \text{ V}$$

¹This homework solution was handwritten by the first author, Liangliang Chen, who consents to use this figure in this document and the paper.

$$Z_R(j\omega) = 300\Omega, Z_L(j\omega) = j250\Omega, Z_C(j\omega) = -j400\Omega$$

Apply KVL:

$$-12\angle 0^\circ - j250I_1 + 300I_1 - j400I_1 = 0$$

$$I_1 = -\frac{12\angle 0^\circ}{300 - j150}$$

$$I_1 = \frac{12\angle 0^\circ}{335.41\angle -26.565^\circ} = -0.0358\angle 26.565^\circ$$

$$I_1 = 0.0358\angle 206.565^\circ \text{ A} = 0.0358\angle -153.44^\circ \text{ A}$$

$$\Rightarrow i_1(t) = 0.0358 \cos(2500t - 153.44^\circ) \text{ A}$$

② Short Circuit V_1 :

$$V_2(j\omega) = 12\angle 0^\circ \text{ V}$$

$$Z_R(j\omega) = 300\Omega, Z_L(j\omega) = j400\Omega, Z_C(j\omega) = -j250\Omega$$

Apply KVL:

$$12\angle 0^\circ + j400I_2 + 300I_2 - j250I_2 = 0$$

$$I_2 = \frac{12\angle 0^\circ}{j400 + 300 - j250} = \frac{12\angle 0^\circ}{300 + j150}$$

$$I_2 = 0.0358\angle -26.565^\circ \text{ A}$$

$$\Rightarrow i_2(t) = 0.0358 \cos(4000t - 26.565^\circ) \text{ A}$$

Final Answer:

$$i(t) = i_1(t) + i_2(t) = [35.8 \cos(2500t - 153.44^\circ) + 35.8 \cos(4000t - 26.56^\circ)] \text{ mA}$$

If you need any further assistance or additional details, feel free to ask!

The following example shows that GPT-4o may provide incorrect information when prompted to extract and print the information from a typed homework solution.

 User

(1) Short Circuit V_2 :

$$V_1(\omega) = 12\angle 0^\circ V, Z_R(\omega) = 300\Omega, Z_L(\omega) = j250\Omega, Z_C(\omega) = -j400\Omega$$

$$\text{Apply KVL: } -12\angle 0^\circ - (j250 + 300 - j400)I_1 = 0$$

$$\begin{aligned} I_1 &= -\frac{12\angle 0^\circ}{300 - j150} \\ &= -\frac{12\angle 0^\circ}{335.41\angle -26.565^\circ} = -0.0358\angle 26.565^\circ A = 0.0358\angle 206.56^\circ A = 0.0358\angle -153.44^\circ A \\ &\rightarrow i_1(T) = 0.0358 \cos(2500T - 153.44^\circ) A \end{aligned}$$

(2) Short circuit V_1 :


$$V_2(\omega) = 12\angle 0^\circ V, Z_R(\omega) = 300\Omega, Z_L(\omega) = j400\Omega, Z_C(\omega) = -j250\Omega$$

$$\text{Apply KVL: } -12\angle 0^\circ + (j400 + 300 - j250)I_2 = 0$$

$$\begin{aligned} I_2 &= \frac{12\angle 0^\circ}{j400 + 300 - j250} \\ &= \frac{12\angle 0^\circ}{300 + j150} = 0.0358\angle -26.56^\circ A \\ &\rightarrow i_2(T) = 0.0358 \cos(4000T - 26.56^\circ) A \end{aligned}$$

$$\text{Final Answer: } i(t) = i_1(t) + i_2(t) = [35.8 \cos(2500t - 153.44^\circ) + 35.8 \cos(4000t - 26.56^\circ)] \text{ mA}$$

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GPT-4o 

Sure, here is the extracted information from the image:

(1) Short Circuit V_2 :

$$V_1(\omega) = 12\angle 0^\circ V, Z_R(\omega) = 300\Omega, Z_L(\omega) = j250\Omega, Z_C(\omega) = -j400\Omega$$

Apply KVL:

$$-12\angle 0^\circ - (j250 + 300 - j400)I_1 = 0$$

$$\begin{aligned} I_1 &= \frac{12\angle 0^\circ}{300 - j150} = \frac{12\angle 0^\circ}{335.41\angle -26.565^\circ} \\ &= -0.0358\angle 26.565^\circ A = 0.0358\angle 206.56^\circ A = 0.0358\angle -153.44^\circ A \end{aligned}$$

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Final Answer:

$$i(t) = i_1(t) + i_2(t) = [35.8 \cos(2500t - 153.44^\circ) + 35.8 \cos(4000t - 26.56^\circ)]mA$$