

# rechnung\_betragundphase\_umkehrintegrator

## Student Group

| First Name | Surname | Matrikel Nr. |
|------------|---------|--------------|
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|-------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|
| \$\backslash;\$<br>\$\backslash;\$<br>\$\backslash;\$ | $U_O = -\{1 \over R \cdot C\} \cdot \int_{t_0}^{t_1} \textcolor{blue}{U_I(t)} \, dt + U_{A0}$                                                              |
| \$\backslash;\$<br>\$\backslash;\$<br>\$\backslash;\$ | insert sine function:<br>$\textcolor{blue}{U_I(t)} = \hat{U}_I \cdot \sin(\omega \cdot t)$                                                                 |
| \$\backslash;\$<br>\$\backslash;\$<br>\$\backslash;\$ | $U_O = -\{1 \over R \cdot C\} \cdot \textcolor{blue}{\int_{t_0}^{t_1} \hat{U}_I \cdot \sin(\omega \cdot t) \, dt} + U_{A0}$                                |
| \$\backslash;\$<br>\$\backslash;\$<br>\$\backslash;\$ | insert root function with limits<br>$\textcolor{blue}{\int_{x_0}^{x_1} \sin(a \cdot x) \, dx} = [-1 \over a] \cdot \cos(a \cdot x) \big _{x_0}^{x_1}$      |
| \$\backslash;\$<br>\$\backslash;\$<br>\$\backslash;\$ | $U_O = -\{1 \over R \cdot C\} \cdot [-\textcolor{blue}{\hat{U}_I \over \omega} \cdot \cos(\omega \cdot t) \big _{t_0}^{t_1}] + U_{A0}$                     |
| \$\backslash;\$<br>\$\backslash;\$<br>\$\backslash;\$ | put constant before integral<br>$U_O = \{ \textcolor{blue}{\hat{U}_I \over \omega} \cdot \cos(\omega \cdot t) \big _{t_0}^{t_1} \} + U_{A0}$               |
| \$\backslash;\$<br>\$\backslash;\$<br>\$\backslash;\$ | insert limits: $t_0=0$ , $t_1=t$<br>$U_O = \{ \textcolor{blue}{\hat{U}_I \over \omega} \cdot \cos(\omega \cdot t) - \textcolor{blue}{\cos(0)} \} + U_{A0}$ |
| \$\backslash;\$<br>\$\backslash;\$<br>\$\backslash;\$ | $\textcolor{blue}{\cos(0)} = 1$                                                                                                                            |
| \$\backslash;\$<br>\$\backslash;\$<br>\$\backslash;\$ | $U_O = \{ \textcolor{blue}{\hat{U}_I \over \omega} \cdot \cos(\omega \cdot t) - 1 \textcolor{blue}{\cos(0)} \} + U_{A0}$                                   |
| \$\backslash;\$<br>\$\backslash;\$<br>\$\backslash;\$ | multiply<br>$U_O = \{ \textcolor{blue}{\hat{U}_I \over \omega} \cdot \cos(\omega \cdot t) - \textcolor{blue}{\hat{U}_I \over \omega} \} + U_{A0}$          |
| \$\backslash;\$<br>\$\backslash;\$<br>\$\backslash;\$ | consider the non-cosine terms:<br>The blue part is independent in time.<br>We assume purely sinusoidal quantities!                                         |
| \$\backslash;\$<br>\$\backslash;\$<br>\$\backslash;\$ | $U_O = \{ \textcolor{blue}{\hat{U}_I \over \omega} \cdot \cos(\omega \cdot t) - \textcolor{blue}{\hat{U}_I \over \omega} \} + U_{A0}$                      |
| \$\backslash;\$<br>\$\backslash;\$<br>\$\backslash;\$ | $U_{C0} = U_{A0} = \textcolor{blue}{\hat{U}_I \over \omega}$                                                                                               |
| \$\backslash;\$<br>\$\backslash;\$<br>\$\backslash;\$ | $U_O = \{ \textcolor{blue}{\hat{U}_I \over \omega} \cdot \cos(\omega \cdot t) \}$                                                                          |
| \$\backslash;\$<br>\$\backslash;\$<br>\$\backslash;\$ |                                                                                                                                                            |
| \$\backslash;\$<br>\$\backslash;\$<br>\$\backslash;\$ | $U_O = \{ \textcolor{blue}{\hat{U}_I \over \omega} \cdot \cos(\omega \cdot t) \}$                                                                          |

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