

RMF úkol č. 8

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1 př č. 3

$$\text{ad 1. } \mathcal{L}[\sin(ax)](\xi) = \int_0^{+\infty} e^{-x\xi} \sin(ax) dx = \frac{1}{2i} \int_0^{+\infty} e^{(ia-\xi)x} - e^{(-ia-\xi)x} dx = \\ \frac{1}{2i} \left(\frac{1}{-ia+\xi} - \frac{1}{ia+\xi} \right) = \frac{ia+\xi-\xi+ia}{2i(\xi^2+b^2)} = \frac{a}{\xi^2+a^2}$$

$$\mathcal{L}[\sin(ax)](\xi) = \frac{a}{\xi^2 + a^2} \quad (1)$$

$$\text{ad 2. } \mathcal{L}[\cos(bx)](\xi) = \int_0^{+\infty} e^{-x\xi} \cos(bx) dx = \frac{1}{2} \int_0^{+\infty} e^{(ib-\xi)x} + e^{(-ib-\xi)x} dx = \\ \frac{1}{2} \left(\frac{1}{-ib+\xi} + \frac{1}{ib+\xi} \right) = \frac{ib+\xi+\xi-ib}{2(\xi^2+b^2)} = \frac{\xi}{\xi^2+b^2}$$

$$\mathcal{L}[\cos(bx)](\xi) = \frac{\xi}{\xi^2 + b^2} \quad (2)$$