

# Elementary Differential Equations (MATH200)

## 6<sup>th</sup> Week Homework

**Problem 1(7.9-3).** Find the general solution of the given system of equations.

$$\mathbf{x}' = \begin{pmatrix} 1 & 4 \\ 1 & -2 \end{pmatrix} \mathbf{x} + \begin{pmatrix} e^{-2t} \\ -2e^t \end{pmatrix}$$

**Problem 2(6.1.6).** Find the general solution of the given system of equations.

$$\mathbf{x}' = \begin{pmatrix} -5/4 & 3/4 \\ 3/4 & -5/4 \end{pmatrix} \mathbf{x} + \begin{pmatrix} 4t \\ e^t \end{pmatrix}$$

**Problem 3(6.1.6).** Use the linearity of the Laplace transform to find the Laplace transform of the given function;  $a$  and  $b$  are real constants.

$$f(t) = e^{at} \cosh(bt)$$

**Problem 4(6.1.7).** Use the linearity of the Laplace transform to find the Laplace transform of the given function;  $a$  and  $b$  are real constants.

$$f(t) = e^{at} \sinh(bt)$$

**Problem 5(6.1.6).** Use the linearity of the Laplace transform to find the Laplace transform of the given function;  $a$  and  $b$  are real constants.

$$f(t) = e^{at} \cos(bt)$$

**Problem 6(6.1.7).** Use the linearity of the Laplace transform to find the Laplace transform of the given function;  $a$  and  $b$  are real constants.

$$f(t) = e^{at} \sin(bt)$$

**Problem 7(7.8-4c).** Find the Laplace transform of the given function.

$$f(t) = \begin{cases} t, & 0 \leq t < 3 \\ 1, & 3 \leq t < \infty \end{cases}$$

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