**W7 InLab Activity: Name: \_ \_ \_ \_ \_ \_ \_ \_ \_ \_ \_ \_ \_ \_ \_ \_ \_ \_ \_ \_ \_ \_ \_ \_ \_ \_ \_ \_ \_ \_**

*first*

*last*

**Summer 2022**

**Problem 1: Find the Laplace Transform for each**

**Tip:** Consult the Table of Laplace Transforms if necessary

**a.** Find the transform if

\_ \_ \_ \_ \_ \_ \_ \_ \_ \_ \_ \_ \_ \_ \_ \_

**b.** Find the transform if

\_ \_ \_ \_ \_ \_ \_ \_ \_ \_ \_ \_ \_ \_ \_ \_

**c.** Find the transform if

\_ \_ \_ \_ \_ \_ \_ \_ \_ \_ \_ \_ \_ \_ \_ \_

**Problem 2: Apply Frequency Shifting – Fill in all the boxes below.**

See identity **29** in the Table of Laplace Transforms.

**Frequency Shifting Property**

If the transform of is , then the transform of is .

**a.** Find the transform if

**i.** Give the function (which does not include the exponential) and its transform .

We see and its Laplace Transform is

**ii.** So

**b.** Find the transform if

**i.** Give the function (which does not include the exponential) and its transform .

We see and its Laplace Transform is

**ii.** So

**c.** Find the **inverse** transform if

**i.** We can frequency shift *G* as follows: where

**ii.** Choosing and find: so that

**Problem 3: Solve a DE using the Laplace Transform – Fill in all the boxes below**

Use Laplace Transforms to solve this differential equation.

**DE:**

Denote the transform of the unknown as as usual.

**a.** Find the transform of the middle term on the LHS:

**b.** Find the transform of the double derivative term on the LHS:

**c.** Find the transform of the RHS forcing function .

**d.** Combine all four terms from the DE and solve for *Y*. **DE:**

Collect all the terms that multiply *Y* on the LHS and the rest on the RHS.

Solve for *Y*:

**e.** Cancel out the common factor of to find *Y*.

**f.** Using partial fractions, you would find:

Give the solution in the time domain.