

Math 2280 - Assignment 9

Dylan Zwick

Summer 2013

Section 7.1 - 1, 6, 20, 30, 36

Section 7.2 - 1, 4, 15, 20, 29

Section 7.1 - Laplace Transforms and Inverse Transforms

7.1.1 - Calculate the Laplace transform of $f(t) = t$ using the definition of the Laplace transform.

7.1.6 - Calculate the Laplace transform of $f(t) = \sin^2 t$ using the definition of the Laplace transform.

7.1.20 - Find the Laplace transform of the function $f(t) = te^t$.

7.1.30 - Find the inverse Laplace transform of the function $F(s) = \frac{9 + s}{4 - s^2}$.

7.1.36 - Show that the function $f(t) = \sin(e^{t^2})$ is of exponential order as $t \rightarrow \infty$ but that its derivative is not.

Section 7.2 - Transformation of Initial Value Problems

7.2.1 - Use Laplace transforms to solve the initial value problem below.

$$x'' + 4x = 0; \quad x(0) = 5; x'(0) = 0.$$

7.2.4 - Use Laplace transforms to solve the initial value problem below.

$$x'' + 8x' + 15x = 0; \quad x(0) = 2; x'(0) = -3.$$

7.2.15 - Use Laplace transforms to solve the initial value problem below.

$$x'' + x' + y' + 2x - y = 0,$$

$$y'' + x' + y' + 4x - 2y = 0;$$

$$x(0) = y(0) = 1; \quad x'(0) = y'(0) = 0.$$

More space for Problem 7.2.15 if you need it.

7.2.20 - Apply Theorem 2 from the textbook to find the inverse Laplace transform of the function

$$F(s) = \frac{2s + 1}{s(s^2 + 9)}.$$

7.2.29 - Derive the Laplace transform given below:

$$\mathcal{L}(t \sinh kt) = \frac{2ks}{(s^2 - k^2)^2}$$