Note the following review problems DO NOT cover all problem types which may appear on the final.

6.3 preliminaries:

1a.) Suppose $f(t) = t^2$, then $f(t-2) =$ ______________________________

1b.) Suppose $f(t) = t^2 + 3t + 4$, then $f(t-2) =$ ______________________________

1c.) Suppose $f(t) = sin(t) + e^{8t}$, then $f(t-2) =$ ______________________________

2a.) Suppose $f(t-2) = (t-2)^2$, then $f(t) =$ ______________________________

2b.) Suppose $f(t-2) = (t-2)^2 + 3(t-2) + 4$, then $f(t) =$ ______________________________

2c.) Suppose $f(t-2) = sin(t-2) + e^{8(t-2)}$, then $f(t) =$ ______________________________

3a.) Suppose $f(t-2) = t^2 + 2t + 5$, then $f(t) =$ ______________________________

3b.) Suppose $f(t-2) = 3t^2 + 8t + 1$, then $f(t) =$ ______________________________

3c.) Suppose $f(t) = cos(t) + 4^{8t}$, then $f(t) =$ ______________________________

Chapter 6:

4.) Find the LaPlace transform of the following:

4a.) $\mathcal{L}(u_3(t^2 - 2t + 1)) =$ ______________________________

4b.) $\mathcal{L}(u_4(e^{-8t})) =$ ______________________________

4c.) $\mathcal{L}(u_2(t^2 e^{3t})) =$ ______________________________

5.) Find the inverse LaPlace transform of the following:

5a.) $\mathcal{L}^{-1}(e^{-8s}\frac{1}{s-3}) =$ ______________________________

5b.) $\mathcal{L}^{-1}(e^{4s}\frac{1}{s^2-3}) =$ ______________________________

5c.) $\mathcal{L}^{-1}(e^{s}\frac{1}{(s-3)^2+4}) =$ ______________________________

5d.) $\mathcal{L}^{-1}(e^{-s}\frac{5}{(s-3)^4}) =$ ______________________________

5e.) $\mathcal{L}^{-1}(\frac{e^s}{4s}) =$ ______________________________

5f.) $\mathcal{L}^{-1}(e^s) =$ ______________________________

6.) Use the definition and not the table to find the LaPlace transform of the following:

6a.) $\mathcal{L}(t^3) =$ ______________________________

6a.) $\mathcal{L}(cos(t)) =$ ______________________________

7.) Find the inverse LaPlace transform of the following. Leave your answer in terms of a convolution integral:

7a.) $\mathcal{L}^{-1}(\frac{1}{(s-2)(s^2+4)}) =$ ______________________________

7b.) $\mathcal{L}^{-1}(\frac{1}{(s-2)(s^2-4s+5)}) =$ ______________________________

7c.) $\mathcal{L}^{-1}(\frac{2s}{(s-2)(s^2-4s+5)}) =$ ______________________________

8.) Find $f * g$

8a.) $4t * 5t^4 =$ ______________________________

8b.) $5t^4 * 4t =$ ______________________________

8c.) $sin(t) * e^t =$ ______________________________

Make sure you can also solve a quick differential equation using the LaPlace transform and use any of the formulas on p. 304.

Chapter 3:

9.) Solve the following initial problems:

9a.) $y'' + 6y' + 8y = 0,\ y(0) = 0,\ y'(0) = 0$

9b.) $y'' + 6y' + 9y = 0,\ y(0) = 0,\ y'(0) = 0$

9c.) $y'' + 6y' + 10y = 0,\ y(0) = 0,\ y'(0) = 0$

9d.) $y'' + 6y' + 8y = cos(t),\ y(0) = 0,\ y'(0) = 0$

9e.) $y'' + 6y' + 9y = cos(t),\ y(0) = 0,\ y'(0) = 0$

9f.) $y'' + 6y' + 10y = cos(t),\ y(0) = 0,\ y'(0) = 0$

3.8: 1-5, 7, 11, 14, 3.9: 1 - 8

Make sure you understand sections 3.8, 3.9

10.) Solve the following initial problems:

10a.) $y' + 3y + 1 = 0,\ y(0) = 0$

10b.) , $y(0) = 0$

*10c.) $cos(t)y' - sin(t)y = \frac{1}{t^2}$, $y(0) = 0$

10d.) $y' = \frac{3x^2-2}{xy-xy^2}$, $y(0) = 0$

Chapter 1:

11.) For each of the following, draw the direction field for the given differential equation. Based on the direction field, determine the behavior of y as $t \to \infty$. If this behavior depends on the initial value of y at $t = o$, describe this dependency.

11a.) $y' = y$

11b.) $y' = 1$

11c.) $y' = y(y+4)$

Chapter 7:

12.) Transform the given equation into a system of first order equations:

12a.) $x''' - 2x'' + 3x' - 4x = t^2$

12b.) $x'''' - 2x'' + 3x' - 4x = t^2$

Make sure you also study exam 1 and 2 as well as everything else. Remember the above list is INCOMPLETE.

* means optional type problem. If a problem like 10c appeared on the final, it would be in the "choose" section.