MA 341 REVIEW SHEET FOR FINAL

- **1.2 Solutions and Initial Value Problems (IVP)**
  -Use the Existence and Uniqueness Theorem (p. 11) ex. p. 14 #23,25, 27
  -Show that a function or relation is or is not a solution. Ex p. 13-14 # 3, 5, 9,11

- **2.2 Separable Equations**
  -Recognize when a d.e. is separable and be able to solve it
  -See Separable Equations WS
  -Examples: p. 46 # 7, 9, 11,17, 23, 24, 25, 29, 34,36

- **2.3 Linear Equations**
  -Solve linear equations (p. 48)
  -Examples: p. 51 # 7,13,15,17

- **2.4 Exact Equations**
  -Know the test for Exactness
  -Examples: p. 61: #9,11,17,21, 23

- **3.2 Mixing Problems**
  -Look at both Mixing Problems Worksheets (WS 1 and WS 2)
  -Be able to set up d.e. when flow rate in=flow rate out & when it doesn't
  -Examples: p. 100: # 1,3,4, 8

- **4.2 Homogeneous Linear Equations**
  -Solve ay''+by'+cy=0 for both cases on p. 163
  -Examples: p. 165 #1,3,13,15,19,43

- **4.3 Auxillary Equations with Complex Roots**
  -Examples p. 173: 1,3,5,21,23,25

- **4.4 Method of Undetermined Coefficients**
  -Know how to find the particular solution. Ex. p. 182 #9,13,15,17,27

- **4.5 Superposition Principle and Undetermined Coefficients Revisited**
  -Using the Superposition principle determine the form of the correct solution
  -Know what to do if y_P overlaps y_c
  -Solve IVPs
  -Examples p. 188 #17-19, 29,30, 33, 35 & Method of Undetermined Coefficients

- **4.6 Variation of Parameters**
  -Know when to use variation of parameters
  -Memorize method p.191 so that you can apply it
  -Examples: p. 193 # 1,3,5,7,15
  Variation of Parameters WS

- **4.9 A Closer Look at Free Mechanical Vibrations**
  -Be able to fill in equation (1) from p. 214
  -Know the different kinds of damping
  -Examples: p. 222 # 1,8 (You will NOT have to find amplitude, period and frequency, etc)

- **4.10 A Closer Look at Forced Mechanical Vibrations**
  -Know what the steady-state solution is
  -Examples: p. 230 # 9,13
  Spring Motion

- **7.3 Properties of the Laplace Transform**
  -I will give you the table
  p. 365 #1-9 odd

- **7.4 Inverse Laplace Transform**
  -Know the method of partial fractions ex. p. 375 # 21, 23, 25
  Inverse Laplace Transform

- **7.5 Solving Initial Value Problems**
  - Know the Method of Laplace Transforms ex. p. 376
  -Examples: p. 382 #1-5 odd, 11,38

- **7.6 Transforms of Discontinuous Functions**
  -Know the definition of the unit step function
  -Express a function using unit step functions and be able to compute its Laplace Transform ex: p. 393 # 5,7,9,11,13,15,17, 29 & Unit Step Functions WS
  Inverse Laplace practice with Unit Step Functions

- **9.3 Matrices and Vectors**
  -Be able to do matrix multiplication, addition, etc and find the inverse of a matrix, know row operations

- **9.4 Linear Systems in Normal Form**
  -Write systems of equations in matrix form
  -ex. p. 523 #1-11 odd

- **9.5 Homogeneous Linear Systems with Constant Coefficients**
  -Given a matrix find its eigenvalues and eigenvectors
  -Find the general solution (Remember for a 3x3 matrix I'll give you the eigenvalues unless they are easy to find)
  -Examples p. 534 # 1,5,13,32

-Look at 9.5 Worksheet

- **9.6 Complex Eigenvalues**
  -I'll give you the form of the general solution if we have complex eigenvalues
  -Examples p. 541 # 1,3,13
  -Look at 9.6 Worksheet

- **9.7 Nonhomogeneous Linear Systems**
  Know the method of Variation of Parameters
  -Know the method of Undetermined Coefficients
  -I will give you the inverse of a 2x2
  -Examples p.547 #1,2,3,11,13,15,21a

- **5.1/5.2 More practice solving systems of equations**
  -Be able to set up an interconnected tank problem
  -Examples p. 251 #31 and problems we've worked in class
  -Look at Mixing Problems with Interconnected Tanks Worksheet

- **5.6 Coupled Mass Springs**
  -Be able to set up the differential equations that describe this system
  -Examples p. 289 #1, 3, and Coupled Springs WS

- **5.4 Introduction to the Phase Plane**
  -ex. p. 272-273 #1,3,5,11,13
    - Note that many of these answers include graphs. Think about these and about what we learned in 12.2. It is likely that you will have to do simple graphs on your final.
    - Be able to solve the phase plane equation

- **12.2 Linear Systems in the Plane**
  -Memorize chart on 732
  -Classify critical points both at origin and not
  -ex. p. 733 #1-11 odd
  Phase Plane

- **12.3 Almost Linear Systems**
  -Classify critical points (at the origin and when there is more than one critical point)
  -Show a system is almost linear
  -Examples p. 743 : #1,3,9,11
  Almost Linear