Thursday, April 24 George Voutsadakis

Read each problem **very carefully** before starting to solve it and do only what is asked. Each problem is worth around 5 points. It is necessary to show **all** your work. Correct answers without explanations are worth 0 points. GOOD LUCK!!

1. [6 points] Find the general solution of the system

$$oldsymbol{y} = \left(egin{array}{cc} 5 & 1 \ -1 & 3 \end{array}
ight) oldsymbol{y}.$$

2. [4 points] Suppose in an application, you encounter the system of differential equations

$$\boldsymbol{y}' = \left(egin{array}{cc} a & 2 \\ -1 & 1 \end{array}
ight) \boldsymbol{y},$$

where a is some constant. You discover that, in order for the physical system modeled by this system to work, you must ensure that the linear system must have a repeated eigenvalue. Your task is to calibrate the value of the parameter a for this to happen.