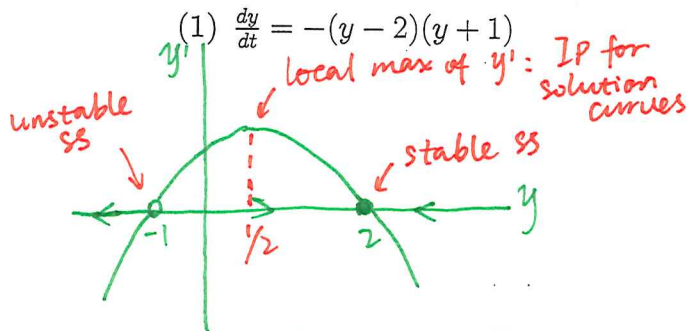


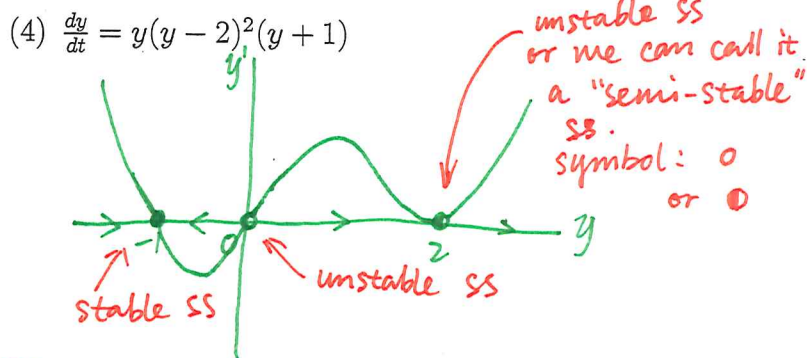
Nov. 7, Wed. (in Christmas livery)

MATH 102:102, AUTONOMOUS DIFFERENTIAL EQUATIONS  
EXERCISE

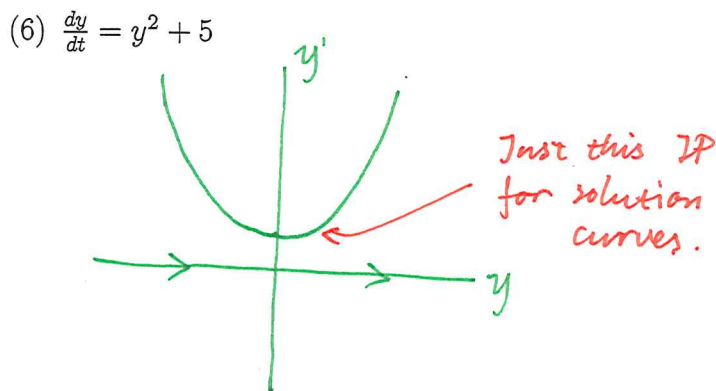
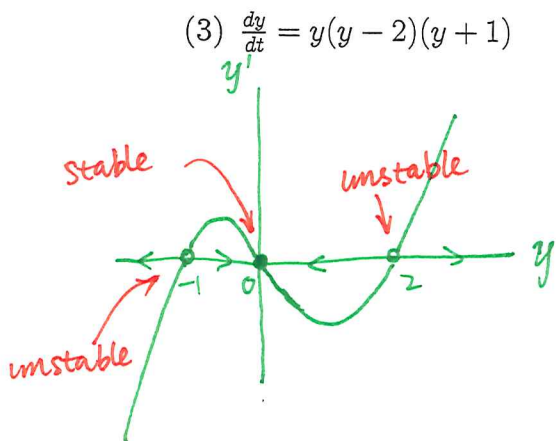
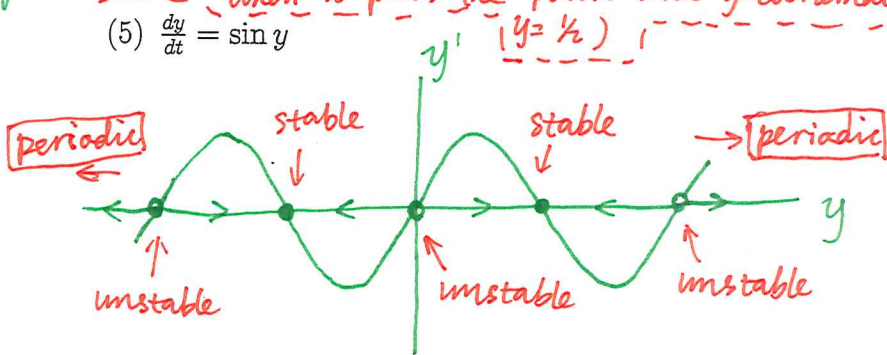
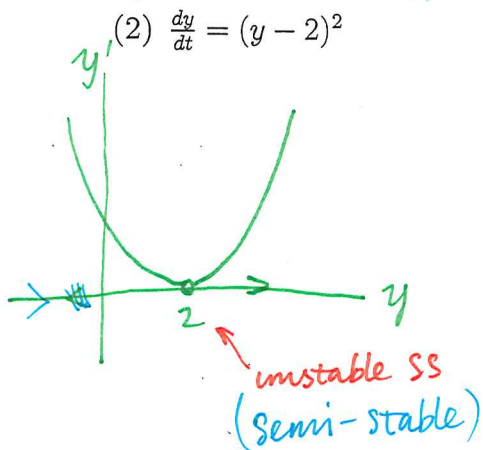
Qualitatively analyze the following differential equations. (Use the graph of  $dy/dt$  vs  $y$  to get you started.)



If  $y(0) < -1$ ,  $y(t)$  decreases ~~disproportionately~~  
 If  $-1 < y(0) < 2$ ,  $y(t)$  increases, approaching 2  
 If  $y(0) > 2$ ,  $y(t)$  decreases, approaching 2



(If further  $-1 < y(0) < 1/2$ , ~~the~~ the curve  $y(t)$  in  $y-t$  plane has an inflection point when it pass the point with  $y$ -coordinate  $y = 1/2$ )



1

No steady states!  
 $y(t)$  always increases!  
 If  $y(0) < 0$ , then  $y(t)$  curve has an inflection point when  $y$  reaches 0.