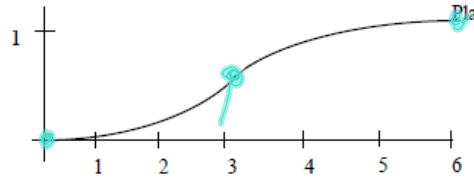
**AP Calculus AB**
**Thursday, October 17, 2013**

**Please fill out the chart at the top of page 95 in the Function Analysis handout.**

Example 6) An airplane starts its descent when it is at an altitude of 1 mile, 6 miles east of the airport runway. Find the cubic function $f(x) = ax^3 + bx^2 + cx + d$ on the interval [0, 6] that describes a smooth glide path for the plane. Also find the location where the plane is descending at the fastest rate.




POI @ $x=3 \rightarrow f''(3)=0$

$y = ax^3+bx^2+cx+d$

$x$ = horizontal distance to runway

$y$ = altitude

$(6, 1) \rightarrow$ start

$(0,0) \rightarrow$ on runway

$0=y \rightarrow 0=x \longrightarrow d=0$

$1 = a\cdot 6^3 + b\cdot 6^2 + c\cdot 6$

$\star\ 1 = 216a + 36b + 6c$

$f(x) = ax^3 + bx^2 + cx + d$

$f'(x) = 3ax^2 + 2bx + c$

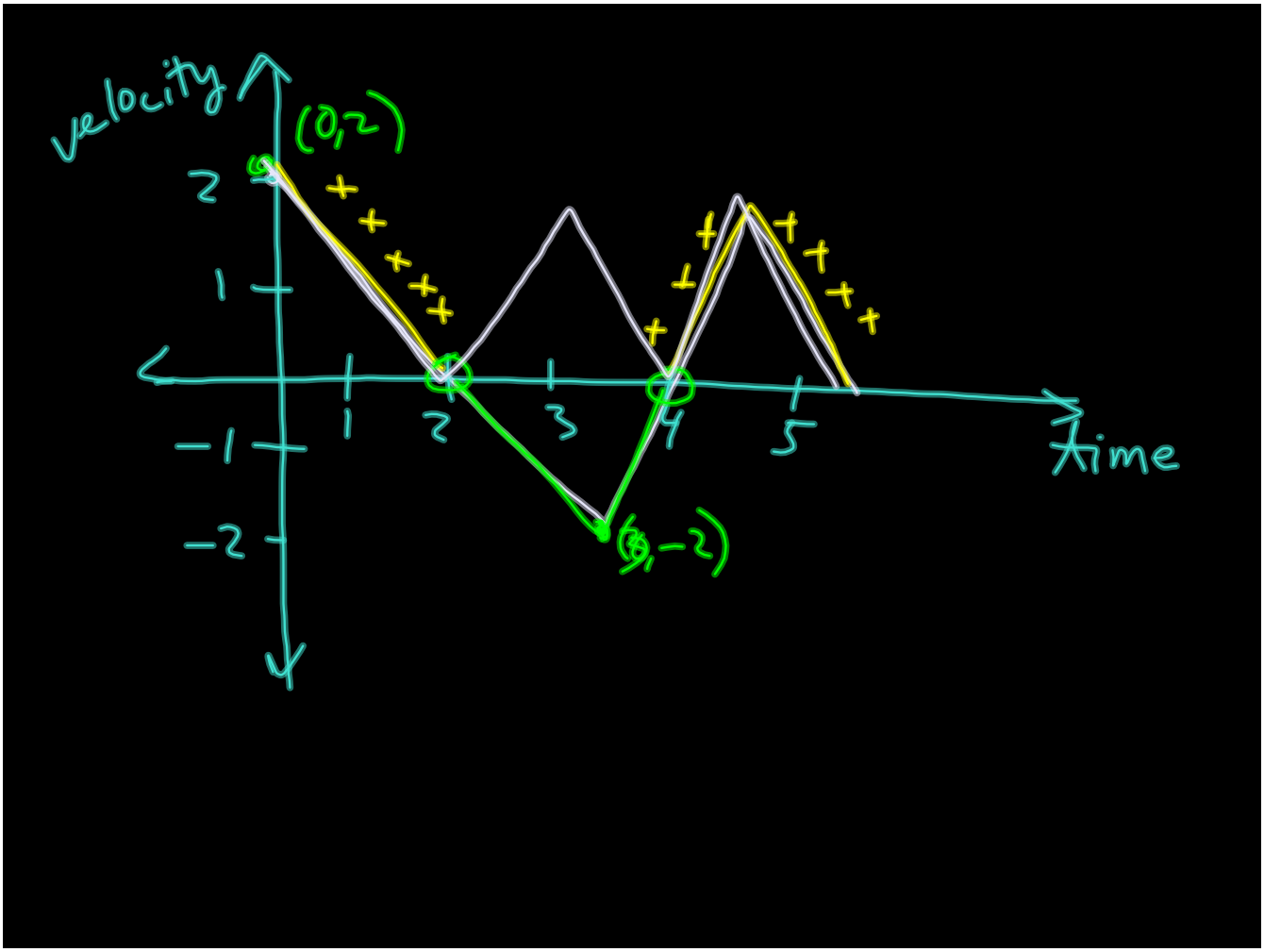
$f''(x) = 6ax + 2b$

$f''(3) = 6a\cdot 3 + 2b = 0$

$18a + 2b = 0$

$9a + b = 0$

$\star\ b = -9a$


velocity
(0,2)
2
1
−1
−2
1
2
3
4
5
time
(3,−2)