Notes on Math Tutorials, week 2
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Overview: I'm lecturing on numerical methods for integration, interpolation, and differentiation on to Monday, Oct 1.

I'd like you to help them get familiar with deriving difference formulae and also general interpolation and error analysis.

A. Find the second order formula for $f'(a)$ when $f(a), f(a+h), f(a+2h)$ are given.

B. Let $y(t)$ be the position of a remote
$\underset{m m}{\overset{\uparrow \nwarrow ms}{}}$
control car on a straight track. Every second, position $y(n)$ and velocity $y'(n)$ is recorded. Suppose it is known that the car can only accelerate / decelerate up to a maximum rate of $3 m/s^2$, i.e. $|y''(t)| \le 3$ for all t.

Suppose $y(3)=4$, $y'(3)=1$

$y(4)=6$ $y'(4)=3$.

a) Estimate $y(3.2)$ using linear interpolation. Find a bound for the error.

b) Estimate $y(3.2)$ using a linear Taylor approximation at $t=3$. Find a bound for the error.

c) Use all the information given to estimate $y(3.2)$.