## Quadratic Approximation

Last class we derived a list of quadratic approximations for values of $x$ near 0 . Using the formula:

$$
f(x) \approx f(0)+f^{\prime}(0) x+\frac{f^{\prime \prime}(0)}{2} x^{2} \quad(x \approx 0)
$$

We can (and eventually will) calculate the following approximations:

- $\sin x \approx x \quad($ if $x \approx 0)$
- $\cos x \approx 1-\frac{x^{2}}{2} \quad($ if $x \approx 0)$
- $e^{x} \approx 1+x+\frac{1}{2} x^{2} \quad($ if $x \approx 0)$
- $\ln (1+x) \approx x-\frac{1}{2} x^{2} \quad($ if $x \approx 0)$
- $(1+x)^{r} \approx 1+r x+\frac{r(r-1)}{2} x^{2} \quad($ if $x \approx 0)$

Eventually you will recognize and remember all of these formulas, but it may take time and practice.

We have not derived the final two approximations on this list; we'll use them in several examples then describe their derivation.

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### 18.01SC Single Variable Calculus] []

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