Quadratic Approximation

Last class we derived a list of quadratic approximations for values of x near 0.

Using the formula:

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

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

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