Announcements

- Department Seminar this afternoon @ 3:30!
- WeBWorK & journal due tonight @ midnight
- Office hours tomorrow (Tuesday 10/20) moved to 12:00 - 1:15
- Pre-Class Assignment due tomorrow @ midnight
- Problem Set #6 due Thursday
- No WeBWorK for next Monday
- Exam 2 next week – Covers through Taylor polynomials
    - Cheat Sheet due Tuesday at 8:00 am
    - Exam will be available starting Tuesday at 8:00 am
    - Exam due at midnight Thursday

Recall the basic ideas of Taylor polynomials

- What is $\sin(2)$? $\cos(0.21327)$? $e^{0.152}$?
- Build a polynomial $P_n(x)$ to approximate a more complicated function like $f(x) = \sin(x)$
- Create $P_n(x)$ so that the derivatives match those of $f(x)$ at $x = 0$

Recall the basic ideas of Taylor polynomials

- What is $\sin(2)$? $\cos(0.21327)$? $e^{0.152}$?
- Build a polynomial $P_n(x)$ to approximate a more complicated function like $f(x) = \sin(x)$
- Create $P_n(x)$ so that the derivatives match those of $f(x)$ at $x = 0$
- The general form is

$$P_n(x) = f(0) + f'(0)x + \frac{f''(0)}{2}x^2 + \frac{f'''(0)}{3!}x^3 \cdots + \frac{f^{(n)}(0)}{n!}x^n$$

Example from video for $f(x) = \sin(x)$

$$P_n(x) = f(0) + f'(0)x + \frac{f''(0)}{2}x^2 + \frac{f'''(0)}{3!}x^3 \cdots + \frac{f^{(n)}(0)}{n!}x^n$$

k	$f^{(k)}(x)$	$f^{(k)}(0)$	$\frac{f^{(k)}(0)}{k!}$	$\frac{f^{(k)}(0)}{k!}x^k$	
0	$\sin(x)$	$\sin(0) = 0$	$\frac{0}{0!} = \frac{0}{1} = 0$	$0 \cdot x^0$	$= 0$
1	$\cos(x)$	$\cos(0) = 1$	$\frac{1}{1!} = 1$	$1 \cdot x$	$= x$
2	$-\sin(x)$	$-\sin(0) = 0$	$\frac{0}{2!} = 0$	$0 \cdot x^2$	$= 0$
3	$-\cos(x)$	$-\cos(0) = -1$	$-\frac{1}{3!}$	$-\frac{1}{3!}x^3$	$= -\frac{x^3}{3!}$
4	$\sin(x)$	$\sin(0) = 0$	$\frac{0}{4!} = 0$	$0 \cdot x^4$	$= 0$

Goal: Build the Maclaurin polynomial $P_3(x)$ for $f(x) = e^x$

Fill in the the rest of the table

k	$f^{(k)}(x)$	$f^{(k)}(0)$	$\frac{f^{(k)}(0)}{k!}$	$\frac{f^{(k)}(0)}{k!}x^k$
0	e^x	$e^0 = 1$	1	$1 \cdot x^0 = 1$
1				
2				
3				

$P_3(x) =$ ____________________

Using the 5th degree Maclaurin polynomial for $f(x) = e^x$, we get $e \approx$

(a) 2.5

(b) 2.667

(c) 2.708

(d) 2.716

(e) 2.718

Goal: Build Maclaurin polynomial $P_4(x)$ for $f(x) = \cos(x)$