Week 1: Orientation, Reading Assignment, Homework Assignment

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Course Website: http://courses.physics.illinois.edu/phys598aem/

All lecture notes, homework, demos, references, *etc*. are available on the P598AEM website. Please spend some time checking these out!

Course Organization:

A. Lectures: Tuesday & Thursday, 12:30-1:50 pm, in 136 Loomis.
B. Weekly Reading and Homework Assignments: HW due following Thursday, in class.
C. Take-Home Midterm Exam: Oct. 10th, due Oct. 17th (in lieu of P598AEM HW 7).
D. Take-Home Final Exam: Dec. 10th, due Dec. 17th.

Reading Assignment For Week 1: Please read/work through P598AEM Lect. Notes 1, 2 & 3
Homework Assignment For Week 1: See/do HW # 1 problems on following pages.

Final P598AEM grade based on:

ΣHW's: 60%
MT: 10%
FE: 30%

Physics 598AEM Week 1 Homework Assignment

A random variable *x* could obey one of the Probability Distribution Functions (P.D.F.) $f(x)$ listed below. Analytically calculate the expectation value/mean $E[x] = \hat{x} = \mu$, variance σ_x^2 and standard deviation σ_x of the following P.D.F's; determine the normalization constant *c* in each case such that $\int_a^b f(x)\,dx = 1$ is satisfied. Make a graph of each P.D.F. and plot the mean and $\pm\sigma$ about the mean.

1.) $f(x) = c\sin x$ on the interval $0 \le x < \pi$.

2.) $f(x) = c\cos x$ on the interval $-\pi/2 \le x < +\pi/2$.

3.) $f(x) = c|\cos x|$ on the interval $0 \le x < \pi$.
Is the standard deviation in this case the same as 1.) or 2.) above? Please comment (briefly)….

4.) $f(x) = c$ on the interval $a \le x < b$, *i.e.* the uniform/flat distribution $U(a,b)$.

5.) $f(x) = \begin{cases} cx & \text{for} \quad 0 \le x < \frac{1}{2} \\ c(1-x) & \text{for} \quad \frac{1}{2} \le x < 1 \end{cases}$

6.) $f(x) = c\sin^2 x$ on the interval $0 \le x < \pi$.

7.) $f(x) = c\cos^2 x$ on the interval $-\pi/2 \le x < +\pi/2$.

8.) $f(x) = c\cos^2 x$ on the interval $0 \le x < \pi$.

9.) $f(x) = \begin{cases} cx^2 & \text{for} \quad 0 \le x < \frac{1}{2} \\ c(1-x)^2 & \text{for} \quad \frac{1}{2} \le x < 1 \end{cases}$