Hwk 1  Due to grader  Fri of wk 2.
Haigh,  1.1 to 1.5,  1.7-1.10

Hwk 2  Due to grader Fri, wk 4.
Haigh,  2.1, 2.3, 2.4,  2.7, 2.10, 2.14, 2.15.
1. Let $X$ be a random variable in $(\Omega, \sigma, P)$;

(a) for real-valued function $f(z) = z^3 + 2z + 1$ where $z$ is real,
give the correct expression for $E[f(X)]$ in terms of integrals;
(b) for real-valued $g(x) = 1/(3x^2)$, and taking discrete $\Omega = \{w_1, ..., w_5\}$, with $P(w_j) = 1/5$ for each $j = 1, ..., 5$, calculate the sigma algebra $\sigma$;
(c) and for the same $g$, $\Omega$ and $P$ as in part (b), calculate numerically $E[g(X)]$ where $X = 1$ is the trivial random variable that takes the constant value 1.

2. With $f$ and $g$ as above, show that $E[f(X) + g(X)] = E[f(X)] + E[g(X)]$ for random variable $X$ in the discrete probability space $(\Omega, \sigma, P)$ in question 1b.

3. Suppose that $X, Y$ are independent random variables in continuous probability space $(\Omega, \sigma, P)$. Show that the joint characteristic function of $X, Y$, namely $\phi_{X,Y}(u_1, u_2) = E[e^{iu_1X+iu_2Y}]$ is equal to the product of characteristic functions, $\phi_X(u_1) \phi_Y(u_2)$ for all $u_1$ and $u_2$ such that $\phi_X(u_1)$ and $\phi_Y(u_2)$ are well-defined.

4. Consider the trivial (constant) random variable $X = 1$ in the discrete probability space $\Omega = \{w_1, ..., w_5\}$, with $P(w_j) = 1/5$ for each $j = 1, ..., 5$:

(a) calculate the distribution function for $X$ defined to be $f_X(a) = P(\{X \leq a\})$ for all real numbers $a$.
(b) calculate the characteristic function for $X$, defined to be $\phi_X(u) = E[e^{iuX}]$ for all real numbers $u$.

Hwk 4 due Friday week 5, and in seminar day before:

3.2, 3.5, 3.6, 3.7, 3.8, 3.9, 3.12

Review for test 1 Thurs week 4
Office hrs week 4 : Tues 1 - 4 pm instead