Homework 6 **92.386 203 Prob & Stat I** **Due Mar 4**

Show all your work. Late Homework will not be accepted without prior approval.

1. Let X be the outcome of throwing a loaded die and suppose $f_X(x) = k\,x$ where k is a constant.

   (a) Find k.

   (b) Find $P(X \text{ is even})$.

   (c) Find $f_Y(y)$ where $Y = (X-3)^2$.

2. Let $f_X(x) = \frac{1}{2}(x+1)$, $|x| < 1$.

   (a) Verify that f_X is a probability density function.

   (b) Draw the graph of f_X and shade the area representing $P(X < 1/2)$. Find this probability.

   (c) Redo (b) for $P(|X| < 1/2)$.

   (d) Find F_X and sketch its graph.

   (e) Find the density and distribution functions for $Y = X^2$.

   (f) Find the density function for $Z = \frac{1}{X}$.

   Bonus. Find and sketch F_Z.

Bonus. Let X have density function $f_X(x) = 3e^{-3x}$, $x > 0$. Find $P(\sin X \le 1/2)$.