Quiz 3

STAT 381, Applied Statistical Methods I, Spring 2015

Name: Solutions

Problem 1. Random variable X can take values 0,1, or 2 with positive probability. It's pmf is $f(x) = c(3+x)$.

a. (3 points) Find the constant c.

$f(0)+f(1)+f(2)=1$

$LHS = c(3+0)+c(3+1)+c(3+2) = c(12) = 1 \Rightarrow \boxed{c=\frac{1}{12}}$

b. (2 points) Find $P(-1 \le X \le 1)$.

$P(-1 \le X \le 1) = P(X=0 \text{ or } X=1)$

$= f(0)+f(1)$

$= \frac{1}{12}(3)+\frac{1}{12}(4) = \boxed{\frac{7}{12}}$

Problem 2. Random variable Y has support $[0,3]$. Its pdf is $f(y) = k(3-y)$.

a. (3 points) Find the constant k.

$\int_0^3 k(3-y)\,dy = k\left[3y-\frac{1}{2}y^2\right]_0^3 = k\left[9-\frac{9}{2}\right] = \frac{9}{2}k = 1$

$\Rightarrow \boxed{k=\frac{2}{9}}$

b. (2 points) Find $P(-1 \le Y \le 1)$.

$P(-1 \le X \le 1) = P(0 \le X \le 1) = \int_0^1 \frac{2}{9}(3-y)\,dy$

$= \frac{2}{9}\left[3y-\frac{1}{2}y^2\right]_0^1 = \frac{2}{9}\left[\frac{5}{2}\right]$

$= \boxed{\frac{5}{9}}$