Stat 2470, Quiz #7, Fall 2014 Name KEY

Instructions: Show all work. Use exact answers or appropriate rounding conventions. If you use your calculator, you can show work by saying which calculator commands you used.

1. Consider the joint probability shown in the table below.

	$x = 0$	$x = 1$	$x = 2$
$y = 0$	0.3	0.18	0.12
$y = 1$	0.18	0.03	0.02
$y = 2$	0.025	0.015	0.01
$y = 3$	0.025	0.015	0.01
$y = 4$	0.1	0.06	0.04

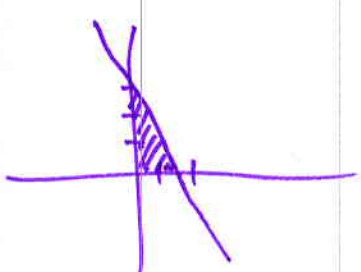
   a. Find $P(X \leq 1, Y \leq 1)$.

   $.3 + .18 + .18 + .03 = .69$

   b. Find $P(X + Y \leq 1)$

   $.3 + .18 + .18 = .66$

2. Consider the joint continuous probability distribution $f(x,y) = kx^3y$ on the region bounded by the coordinate axes, and the line $y = 3 - 2x$. Find the value of k that will make this a legitimate probability distribution.



$$\int_0^{3/2}\int_0^{3-2x} kx^3y\,dy\,dx$$

$$\int_0^{3/2} \frac{kx^3y^2}{2}\Big|_0^{3-2x} dx$$

$$= \frac{k}{2}\int_0^{3/2} x^3(3-2x)^2\,dx$$

$$x^3(9 - 12x + 4x^2)$$

$$\frac{k}{2}\int_0^{3/2} 9x^3 - 12x^4 + 4x^5\,dx$$

$$\frac{k}{2}\left[\frac{9}{4}x^4 - \frac{12}{5}x^5 + \frac{2}{3}x^6\right]_0^{3/2} = \frac{k}{2}\left[\frac{9}{4}\left(\frac{3}{2}\right)^4 - \frac{12}{5}\left(\frac{3}{2}\right)^5 + \frac{2}{3}\left(\frac{3}{2}\right)^6\right]$$

$$= \frac{k}{2}\left[\frac{243}{320}\right] = k\frac{243}{640} = 1$$

$$k = \frac{640}{243}$$