JOINT DENSITY FUNCTIONS

(1-3) Let $p(x,y)=\begin{cases}\frac{3}{2}x+3y & \textit{if } 0\le x\le 1 \textit{ and } 0\le y\le x\\ 0 & \textit{elsewhere}\end{cases}$ be a joint density function.

1. Find the probability that $\frac{1}{2}\le x\le 1$ and $0\le y\le \frac{1}{2}$.

2. Find the probability that $\frac{1}{2}\le x\le 1$ and $0\le y\le x$.

3. Find the probability that $0\le y\le \frac{1}{2}$ and $y\le x\le \frac{1}{2}$.

4. If $p(x)=\frac{1}{\sqrt{2\pi}}e^{-\frac{x^2}{2}}$ is a normal distribution with $\mu=0$ and $\sigma=1$ and if $q(y)=\frac{1}{\sqrt{2\pi}}e^{-\frac{y^2}{2}}$ is another normal distribution with $\mu=0$ and $\sigma=1$, then find the probability that $-1\le x\le 1$ and $-1\le y\le 1$. Set up a double integral and use **fnInt** on your TI-83/84 calculator to approximate numerically rounding to the nearest hundredth.

5. If the weights of adult men are normally distributed with a mean of 200 pounds and a standard deviation of 10 pounds, and if IQ is normally distributed with a mean of 100 and a standard deviation of 15 points, then what is the probability that an adult male has a weight between 200 and 210 pounds and an IQ between 100 and 120? Let *x* equal weight and *y* equal IQ, set up a double integral, and use **fnInt** on your TI-83/84 calculator to approximate numerically rounding to the nearest hundredth. Use the general formula for a normal distribution, $f(x)=\frac{1}{\sigma\sqrt{2\pi}}e^{-\frac{1}{2}\left(\frac{x-\mu}{\sigma}\right)^2}$.