**Math 3339** Name:

# HW #5

To find the numerical solutions of problems 4-6, you can should the commands `pnorm` and `qnorm` in R.

(1) Let $X$ and $Y$ have the following joint p.d.f.

| | | **x** | |
|---|---|---|---|
| **y** | 1 | 2 | 3 |
| 1 | 0.05 | 0.15 | 0.15 |
| 2 | 0.10 | 0.10 | 0.10 |
| 3 | 0.15 | 0.15 | 0.05 |

(a) Calculate the marginal densities. Are $X$ and $Y$ are independent?

(b) Compute the means and variances.

(c) Are $X$ and $Y$ positively correlated? negatively correlated? uncorrelated?

(2) Let $W = 1 - X + 2Y$ be a discrete random variable where $X$, $Y$ are independent discrete random variables with $\mu_X = 5$, $\mu_Y = 2$, and $\sigma_Y^2 = 2$, $\sigma_X^2 = 1$. Compute $\mu_W$ and $\sigma_W^2$.

(3)[4 Pts] let $X$ be a continuous r.v. with pdf $f(x) = 3(1-x)^2$, $0 \leq x \leq 1$.

(a) Graph the pdf;
(a) find the mean of $X$;
(c) compute $P(0.1 < X < 0.5)$;
(d) compute $P(X > 0.4)$.

(4)[4 Pts] Let $Z$ be a standard normal random variable and calculate the following probabilities, drawing pictures wherever appropriate

(a) $P(Z \leq 1)$;
(a) $P(|Z| \leq 2.5)$;
(c) $P(1.37 < Z)$;
(d) $P(-1.5 < Z < 2)$.

(5)[4 Pts] Let $X$ be a normal random variable with mean 12 and standard deviation 3. Calculate the following probabilities

(a) $P(X \leq 4)$;
(a) $P(|X| \leq 6)$;
(c) $P(X > 4.5)$;
(d) $P(-1.5 < X < 4)$.

(6)[4 Pts] Determine the value of the constant $c$ that makes the probability statement correct.

(a) $P(0 \leq Z \leq c) = 0.291$;

(a) $P(|Z| \leq c) = 0.668$ ;

(c) $P(c < Z) = 0.121$;

(d) $P(Z < c) = 0.9838$.