

Midterm Exam II

Math 361
9/27/10

Name: _____

Read all of the following information before starting the exam:

- READ EACH OF THE PROBLEMS OF THE EXAM CAREFULLY!
- Show all work, clearly and in order, if you want to get full credit. I reserve the right to take off points if I cannot see how you arrived at your answer (even if your final answer is correct).
- A single $8\frac{1}{2} \times 11$ sheet of notes (double sided) is allowed. Calculators are permitted.
- Circle or otherwise indicate your final answers.
- Please keep your written answers clear, concise and to the point.
- This test has . problems and is worth 100 points. It is your responsibility to make sure that you have all of the pages!
- Turn off cellphones, etc.
- READ EACH OF THE PROBLEMS OF THE EXAM CAREFULLY!
- Good luck!

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1. (20 points) A random variable X has pdf $f(x) = \frac{1}{2}e^{-|x|}$ for $-\infty < x < \infty$ **a.** (8 pts)
Compute $\text{Var}(X)$ and $\mathbb{E}[X]$.

b. (6 pts) Use Chebyshev's inequality to estimate $\mathbb{P}(|X| > 100)$.

c. (6 pts) Compute $\mathbb{P}(|X| > 100)$.

2. (20 points) A dice is rolled 5 times. Let X denote the maximum value rolled, and let Y denote the minimum value rolled.

a. (10 pts) Compute the marginal pmf of X $p_X(x)$.

b. (10 pts) Compute the joint pmf $p_{X,Y}(x,y)$.

3. (20 points) Let X and Y have joint pdf $f_{X,Y}(x,y) = e^{-x-y}$ for $0 < x < y < \infty$.

a. (7 pts) Compute $\mathbb{E}[X^2 + 2YX]$.

b. (7 pts) Compute the conditional pdf $f_{X|Y}(x|y)$.

c. (6 pts) Compute the condition expectation $\mathbb{E}[X|Y = y]$.

4. (20 points) Suppose X_1 and X_2 have joint pdf $f_{X_1, X_2}(x, y) = \frac{3}{8}x^3y$ for $0 < x < y < 2$. Let $Y_1 = X_1X_2$ and $Y_2 = X_2$. **a.** (10 pts) Compute the joint pdf of Y_1 and Y_2

b. (10 pts) Compute the marginal pdf of Y_1 .

5. (20 points) Suppose X has pdf $f_X(x) = xe^{-x}$ for $x \geq 0$.
mgf of X , $M_X(t)$. For what t does this exist?

a. (10 pts) Compute the

b. (10 pts) Y has mfg $M_Y(t) = \frac{1}{1+2t}$. Compute $\mathbb{E}[Y^3]$.

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