Math 493. Practice Problems for Chapters 7 and 8.

1. Problem 75, p.379.

2. Problem 68, p.378.

3. Let $T$ be the triangle with vertices $(0,0),(1,0)$ and $(1,2)$. Suppose that $X$ and $Y$ have a joint p.d.f. $f$, where $f(x,y)=\frac{5}{2}x^2y$ when $(x,y)\in T$ and $f=0$ elsewhere. Find $E(Y|X)$, $E(Y^2|X)$, and $E\mathrm{Var}(Y|X)$, and verify that

$$E(\mathrm{Var}(Y|X))+\mathrm{Var}E(Y|X)=\mathrm{Var}Y.$$

4. Problems 2 and 3 on p.412-413. In 2(a), use Markov's inequality, along with the assumption that the lowest possible score is zero. In 2(b) and 2(c), use Chebyshev's inequality.

5. Problem 11 on p.413. Use the central limit approximation, and note that $Y_n=\sum_{i=1}^n X_i+100$.

6. Consider the situation of Problem 5 above.

(a) Show that if $a$ is any number larger than 100, then

$$\lim_{n\to\infty} P(Y_n>a)=1/2.$$

(b) Find the smallest value of $n$ furnshed by the central limit approximation for which

$$P(Y_n>1,000)>.49.$$

(c) Find $\lim_{n\to\infty} P(99.9<Y_n<100.1)$.

**More Recommended Problems**

pp.373-379: 51, 52, 57, 64, 65.

pp. 412-414: 1,7,19. For 19, use Jensen's inequality to get a numerical upper or lower bound.