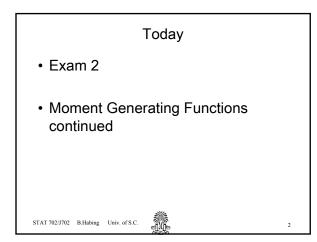


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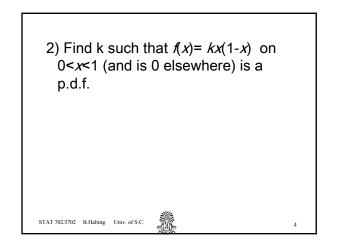
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Exam 2 #1) Let X and Y be independent random variables where X is exponential with  $\lambda$ =2 and Y is normal with  $\mu$ =4 and  $\sigma$ =6. Find E(X+Y) and Var(X+Y).

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3) Let the random variable X have c.d.f.  $F(x) = \frac{1}{2}(1 + x^3)$  on  $-1 \le x \le 1$ (and 0 otherwise). Find E(X) and Var(X).

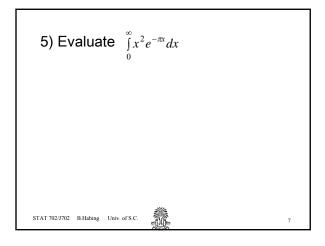
4) Leaks due to manufacturing defects occur in a brand of hose at a rate of approximately 1 per 500 feet. Name an appropriate distribution and estimate the probability that the first defect will be found in the first 100 feet.

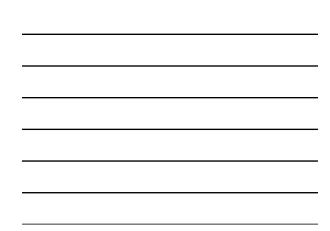
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6) Let X have a uniform distribution on (-π/2, π/2). Find the c.d.f. and p.d.f. of Y=tanX.

7) Let  $f_{XY}(x,y) = \frac{1}{4} + \frac{xy}{16}$ on -1 < x < 1, -1 < y < 1 (and be 0 otherwise). Find the conditional distributions of X|Y and Y|X. Also, are X and Y independent? 8) Let X and Y be independent chisquare random variables with 1 degree of freedom. (The p.d.f. is on page 59.) Derive the p.d.f. of Z=X/Y.

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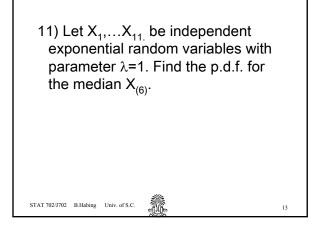
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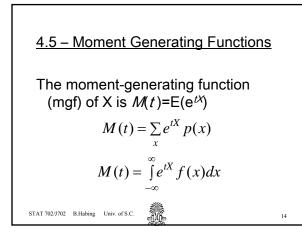
9) In class we showed how to get general formula's for the p.d.f.'s of Z=X/Y and Z=X+Y. Show that if X and Y have joint p.d.f.  $f_{XY}(x,y)$  and Z=XY that  $f_Z(z) = \int_{-\infty}^{\infty} f_{XY}\left(x,\frac{z}{x}\right) \frac{1}{|x|} dx$ .

10) Let X and Y have joint p.d.f.  $f_{XY}(x,y) = 1 + (1-2x)(1-2y)$  on 0 < x <1,0 < y < 1 (and be 0 elsewhere). Find the joint p.d.f. of U=X+Y and V=X+2Y.

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Properties of m.g.f.'s

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- a) If the m.g.f. exists on an interval around zero then M<sup>(k)</sup>(0)=E(X<sup>k</sup>)
- b)The m.g.f. uniquely determines the p.d.f.
- c) If Y=a+bX then  $M_Y(t)=e^{at}M_X(bt)$

d)If X and Y are independent and

Z=X+Y then  $M_Z(t)=M_X(t) M_Y(t)$ 

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