14.381 Problem Set 2
Statistics Fall, 2004

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Due September 24 in Recitation

1. Let X be a random variable with cdf $F(x)$ defined as follows:
$$F(x) = \begin{cases} 0, \text{ for } x < 0 \\ \frac{x^3}{8}, \text{ for } 0 \leq x \leq 2 \\ 1, \text{ for } x > 2 \end{cases}$$
Let $Y = F(X)$. Prove that Y is uniformly distributed.

2. C&B 2.4

3. C&B 2.13 (Hint: $\sum_{k=1}^{\infty} kp^{k-1} = \frac{1}{(1-p)^2}$.)

4. C&B 2.23

5. C&B 2.25

6. C&B 2.30 (a), (b)

7. C&B 2.33 (a), (c)

Just for fun, not due:

8. Let X be a random variable with mean μ, variance σ^2, and mgf $M_X(t)$. Let c be a positive constant, and let Y be a random variable with mgf $M_Y(t) = e^{c[M_X(t)-1]}$. Find expressions for the mean and variance of Y in terms of the mean and variance of X.

9. C&B 2.34