Test 2

58 + 5

63

1. success = .2, only needs to find 1 success

10 this is a negative binomial dist.

$EX = r/p = 1/.2 = 5$ $\quad VarX = \frac{r(1-p)}{p^2} = \frac{.8}{.04} = \frac{80}{4} = 20$

2. (a)

X	-2	0	5
PX	.5	.25	.25

Y	0	6	7
PY	.6	.3	.1

(b) $EX = -2\cdot.5 + 0\cdot.25 + 5\cdot.25$ $\quad EY = 0 + 1.8 + .7$

$= -1 + 0 + 1.25$ $\quad = 2.5$

$= .25$ or $1/4$

10

(c) to be independant, $P(X=x, Y=y) = P(X=x)\cdot P(Y=y)$ for all x, y

$P(X=-2, Y=0) = .3$ $\quad P(X=-2) = .5$ $\quad P(Y=0) = .6$

$P(X=5, Y=7) = .03$ $\quad P(X=5) = .25$ $\quad P(Y=7) = .1$

$.3 \neq .25\cdot.1$ $\therefore$ they are not independant

3. (a) $P(X>25) = \int_{25}^{\infty} 20x^{-2}\,dx = -\frac{20}{x}\Big|_{25}^{\infty} = 0 - \left(-\frac{20}{25}\right) = \boxed{4/5}$ (Part a)

7 (b) CDF = $\int$ PDF $\therefore \int 20x^{-2} = \int 20x^{-2} = -\frac{20}{x}$

$$F_X(x) = \begin{cases} -\frac{20}{x} & \text{for } x > 20 \\ 0 & \text{otherwise} \end{cases}$$

4. $X \sim N(\mu=5, \sigma^2=9)$ ✓

ⓐ $P(X<8) = P\left(\frac{X-\mu}{\sigma} < \frac{8-5}{3}\right) = P(Z<1) = \phi(1)$ 5

ⓑ $Y = aX+b$, $Y \sim N(\mu=17, \sigma^2=36)$?

5. exponential distribution does not depend on the past,

$\mu = 5 = 1/\lambda$, $\lambda = 1/5$ $f_X(x) = \frac{1}{5}e^{-1/5 x}$ 10

$\int_6^\infty \frac{e^{-\frac{x}{5}}}{5} = -e^{-\frac{x}{5}}\Big|_6^\infty = 0 + e^{-6/5} = 1/e^{6/5}$ ✓

6. for one day: uniform dist, $N=5$ 7

$EX = 3$, $VarX = \frac{24}{12} = 2$

$Y = \cancel{7X}$ $\therefore$ $\boxed{EY = 21, \ VarY = 98}$ ✗

(Y is the movies in 1 week)

$Y \neq 7X$

$Y = X_1 + \dots + X_7$

not the same.

7. ⓐ ~~we can tell both are binomial~~ ✓ 1

(2 trials)

X	1	0
PX	2/3	1/3

(3 trials)

Y	1	0
PY	1/2	1/2

=)

a)

~~b~~

b)

c) ?

8. $f_X(x) = \frac{1}{18}$ for $[2, 20]$ $X = S_n$

$\begin{array}{r} 18 \\ \times 18 \\ \hline 144 \\ 180 \\ \hline 324 \end{array}$

8 $EX = 11$ $\text{Var}X = \frac{18^2}{12} = \frac{324}{12} = 27$

$ES_n = 30 \cdot 11 = 330$ $\text{Var}\, S_n = 30 \cdot 27 = 810$ $\sigma = 30 \cdot \frac{18}{\sqrt{12}} = \frac{18\sqrt{12}}{12} = 6\sqrt{3}$

$P(S_n < 240) = P\left(Z < \frac{240-330}{6\sqrt{3}}\right) = \phi(-5\sqrt{3})$

?

9.

0

10) 0