HW Section 8.1 p.523

(13) X = number of children who have type O blood.

B(5, .25)   n=5   p=.25   q=.75

a) $P(X=2) = {}_5C_2(.25)^2(.75)^3 = .2627$

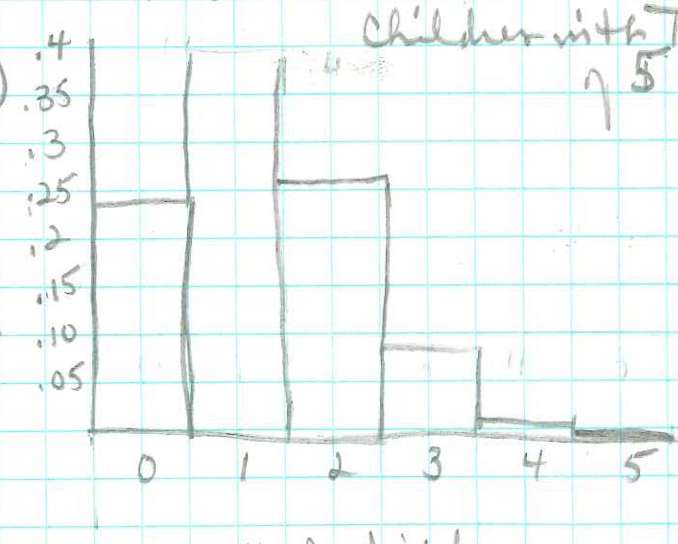
* binomialpdf(5, .25, 2)   The probability that exactly 2 out of 5 randomly selected children have type O blood is 26.27%.

b)

X	0	1	2	3	4	5
P(x)	.2373	.3955	.2637	.0879	.0146	.0010

c) $\Sigma\ p(x_i) = 1$ .2373 + .3955 + .2637 + .0879 + .0146 + .0010 = 1

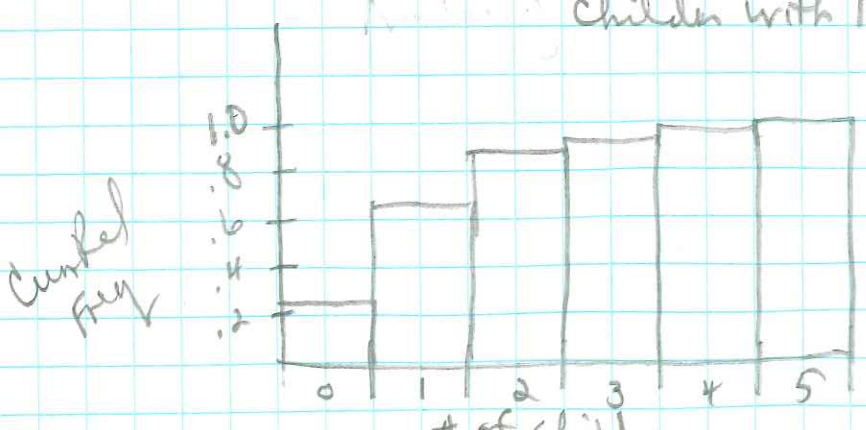
d) Children with Type O blood in a Family of 5 Children



e)

X	0	1	2	3	4	5
F(x)	.2373	.6328	.8965	.9844	.9990	1.000

Children with Type O Blood in Family of 5 children



(14) X = # of questions answered correctly on 50 item true-false quiz

$n = 50 \quad p = .5 \quad q = .5 \quad B(50, .5)$

a) $P(X \geq 25) = .5561$

$_{50}C_{25}(.5)^{25}(.5)^{25} + {}_{50}C_{26}(.5)^{26}(.5)^{24} + \ldots + {}_{50}C_{50}(.5)^{50}(.5)^{0}$

OR $1 - P(X \leq 24) = 1 - .4439 = .5561$ *binomialcdf(50, .5, 24)

$1 - [{}_{50}C_0(.5)^0(.5)^{50} + {}_{50}C_1(.5)^1(.5)^{49} + \ldots {}_{50}C_{24}(.5)^{24}(.5)^{26}]$

There is a 55.61% probability that James answers 25 or more true-false questions correctly out of 50 questions.

b) $P(X \geq 30) = .1013$

$_{50}C_{30}(.5)^{30}(.5)^{20} + {}_{50}C_{31}(.5)^{31}(.5)^{19} + \ldots + {}_{50}C_{50}(.5)^{50}(.5)^{0}$

OR $1 - P(X \leq 29) = 1 - .8987 = .1013$ *binomialcdf(50, .5, 29)

$1 - [{}_{50}C_0(.5)^0(.5)^{50} + {}_{50}C_1(.5)^1(.5)^{49} + \ldots {}_{50}C_{29}(.5)^{29}(.5)^{21}]$

There is a 10.13% probability that James answers at least 30 true-false questions correctly out of 50 questions.

c) $P(X \geq 32) = .0325$

$_{50}C_{32}(.5)^{32}(.5)^{18} + {}_{50}C_{33}(.5)^{33}(.5)^{17} + \ldots + {}_{50}C_{50}(.5)^{50}(.5)^{0}$

OR $1 - P(X \leq 31) = 1 - .9675 = .0325$ *binomialcdf(50, .5, 31)

$1 - [{}_{50}C_0(.5)^0(.5)^{50} + {}_{50}C_1(.5)^1(.5)^{49} + \ldots {}_{50}C_{31}(.5)^{31}(.5)^{19}]$

There is a 3.25% probability that James answers at least 32 true-false questions correctly out of 50 questions.

(15) X = # of questions answered correctly

$B(10, .25)$ $n=10$ $p=.25$ $q=.75$

a) $P(X \geq 1) = .9437$

$1 - P(X=0)$ *binomialpdf (10, .25, 0)

$1 - {}_{10}C_0 (.25)^0 (.75)^{10}$

b) Not a binomial distribution → different probability from "trial" (question) to "trial".

$P(X \geq 1) = 1 - P(X=0)$ $P(X=0) =$

means every question is wrong

$\frac{2}{3} \cdot \frac{3}{4} \cdot \frac{4}{5}$

$1 - .4 = .6$ $= \frac{2}{5} = .4$

The probability that Erin gets at least 1 question correct is 60%.

(16) a)
- Set # of trials → $n = 100$ children
- Success → parent incarcerated
  Failure → parent not incarcerated
- Independent → one child's response independent of next child
- $p = .02$

$B(100, .02)$

b) $P(X=0)$ prob that none of the selected 100 children has a parent in jail.

$P(X=0) = {}_{100}C_0 (.02)^0 (.98)^{100} = .1326$ *binomialpdf (100, .02, 0)

The probability that 0 out of 100 randomly selected children have a parent in jail is 13.26%.

$P(X=1) = {}_{100}C_1 (.02)^1 (.98)^{99} = .2707$ < binompdf(100, .02, 1)

The probability that exactly 1 child out of 100 randomly selected children has a parent in jail is 27.07%.