Problems 1−7

N = 4 (four pack of energy drink)

p = 0.032 (probability there will be more than number of ounces on the can)

q = $1-0.032$ ▸ 0.968

1) Model P(x) = $\mathrm{nCr}(4,x)\cdot 0.032^{x}\cdot 0.968^{4-x}$

Model P(x) $\mathrm{binompdf}(4,0.032,x)$

2) table

$\mathrm{binomPdf}(4,0.032)$ ▸ $\{0.878014,0.116101,0.005757,0.000127,0.000001\}$

3) $P(x=1)=\mathrm{binomPdf}(4,0.032,1)$ ▸ 0.116101

4) $P(x>2)=P(x\geq 3)=P(3\leq x\leq 4)=\mathrm{binomCdf}(4,0.032,3,4)$ ▸ 0.000128

5) $P(x\leq 3)=P(0\leq x\leq 3)=\mathrm{binomCdf}(4,0.032,0,3)$ ▸ $0.999999\approx 1$

6) $P(1<x\leq 3)=P(2\leq x\leq 3)=\mathrm{binomCdf}(4,0.032,2,3)$ ▸ 0.005884

7) p becomes q

Model P(x) = $\mathrm{nCr}(4,x)\cdot 0.968^{x}\cdot 0.032^{4-x}$

Model P(x) $\mathrm{binompdf}(4,0.968,x)$

Problems 8−13

N = 6 (six bags of M&Ms)

p = 0.1224 (probability there will be less than 14 M&Ms in the bag)

q = $1-0.1224$ ▸ 0.8776

8) Model P(x) = $\displaystyle\sum_{i=low}^{high}\left(\mathrm{nCr}(6,i)\cdot 0.1224^{\,i}\cdot 0.8776^{\,6-i}\right)$

Model P(x) $\mathrm{binomCdf}(6,0.1224,low,\ high)$

9) table

$\mathrm{binomCdf}(6,0.1224)$ ▸ $\{0.456856,0.839166,0.97247,0.997259,0.999852,0.999997,1.\}$

10) $P(x=4)=\mathrm{binomPdf}(6,0.1224,4)$ ▸ 0.002593

11) $P(x<4)=P(x\leq 3)=P(0\leq x\leq 3)=\mathrm{binomCdf}(6,0.1224,0,3)$ ▸ 0.997259

12) $P(x\geq 3)=P(3\leq x\leq 6)=\mathrm{binomCdf}(6,0.1224,3,6)$ ▸ 0.02753

13) $P(2<x\leq 5)=P(3\leq x\leq 5)=\mathrm{binomCdf}(6,0.1224,3,5)$ ▸ 0.027527

14) n=12 p =0.5(heads) $P(x<5)=P(0\le x\le 4)$ = binomCdf(12,0.5,0,4) ▸ 0.193848

15) n =31 p =0.12 (will snow) $P(x\ge 3)=P(3\le x\le 31)$=binomCdf(31,0.12,3,31) ▸ 0.736268

16) n = 50 p = 0.48 (dislike high school) $P(x=12)$ =binomPdf(50,0.48,12) ▸ 0.000293

17) n = 24 p =0.35 (die)

this asks about saplings that live so p changes to 0.65

n = 24 p =0.65(live) $P(x\ge 15)=P(15\le x\le 24)$ =binomCdf(24,0.65,15,24) ▸ 0.68665

18) n = 12 p =0.10 (faulty water bottles) $P(x\le 2)=P(0\le x\le 2)$ =binomCdf(12,0.1,0,2) ▸ 0.88913

19) n = 50 p =0.028 (faulty ties) $P(x=5)$ = binomPdf(50,0.028,5) ▸ 0.010159

20) $n = 11$ $p = 0.97$ (falling bottles) BUT this problem asked about NOT falling bottles

$n = 11$ $p = 0.03$ (NOT falling bottles)

$P(x>5) = P(x\geq 6) = P(6\leq x\leq 11) =$ binomCdf(11,0.03,6,11) ▸ 2.95709E-7 ≈0.0000

21) $n = 8$ $p = 0.008$ (defective component)

P(not working perfectly) $=P(x>0) = P(x\geq 1)$

$=P(1\leq x\leq 8)=$ binomCdf(8,0.008,1,8) ▸ 0.062236

22) $n = 8$ $p = 0.008$ (defective component)

P(working perfectly) $=P(x=0) =$ binomPdf(8,0.008,0) ▸ 0.937764

23) $n = 58$ $p = 0.10$ (defective toy)

$P(x=10) =$ binomPdf(58,0.1,10) ▸ 0.0332

24) $n = 50$ $p = 0.79$ (from the state) BUT this problem asked about NOT from state

$n = 50$ $p = 0.21$ (NOT from state)

$P(x>3) = P(x\geq 4) = P(4\leq x\leq 50) =$ binomCdf(50,0.21,4,50) ▸ 0.996431

25−32 n = 5 p= ???? (must use table)

25) find q

$1 = 0.2486+0.399+0.2562+.0132+0.0008+q$

$1=q+0.9178$

$q = 1-0.9178 \blacktriangleright 0.0822$

	A	B	C	D
=				
1	x	p(x)		
2	0	0.2486		
3	1	0.399		
4	2	0.2562		
5	3	q	0.0822	
6	4	0.0132		
7	5	0.0008		
8				
9				
10				
11				

C8

25−32 n = 5 p= ???? (must use table)

26) Complete Cumulative distribution table

c_p(0) =0.2486 (always same)

c_p(1) =0.2486+0.399 ▸ 0.6476

c_p(2) =0.2486+0.399+0.2562 ▸ 0.9038

c_p(3) =0.2486+0.399+0.2562+0.0822 ▸ 0.986

c_p(4) =0.2486+0.399+0.2562+0.0822+0.0132 ▸ 0.9992

c_p(5) =0.2486+0.399+0.2562+0.0822+0.0132+0.0008=1

NOTE the LAST entry is the ONLY entry that can ever be 1 exactly!

	A	B	C	D
=				
1	x	p(x)	c_p(x)	
2	0	0.2486	0.2486	
3	1	0.399	0.6476	
4	2	0.2562	0.9038	
5	3	0.0822	0.986	
6	4	0.0132	0.9992	
7	5	0.0008	1.	
8				
9				
10				
11				

C2 0.2486

25−32 n = 5 p= ???? (must use table)

27) $P(2 \le x \le 4) = P(2) + P(3) + P(4)$

$= 0.2562+0.0822+0.0132$ ▸ 0.3516

28) $P(0 \le x \le 3) = P(0)+P(1)+P(2)+P(3)$

$= 0.2486+0.399+0.2562+0.0822$ ▸ 0.986

OR this is in the cumulative distribution chart

29) $P(1<x<5) = P(2 \le x \le 4)$

$= P(2) + P(3) + P(4)$

$= 0.2562+0.0822+0.0132$ ▸ 0.3516

30) $P(2<x<5) = P(3 \le x \le 4)$

$= P(3) + P(4)$

$= 0.0822+0.0132$ ▸ 0.0954

	A	B	C	D
=				
1	x	p(x)	c_p(x)	
2	0	0.2486	0.2486	
3	1	0.399	0.6476	
4	2	0.2562	0.9038	
5	3	0.0822	0.986	
6	4	0.0132	0.9992	
7	5	0.0008	1.	
8				
9				
10				
11				

D5

25−32 n = 5 p= ???? (must use table)

31) $P(0<x\leq 3) = P(1\leq x\leq 3)$

$= P(1)+P(2)+P(3)$

$= 0.399+0.2562+0.0822 \blacktriangleright 0.7374$

32) $P(2\leq x<4) = P(2\leq x\leq 3)$

$= P(2)+P(3)$

$= 0.2562+0.0822 \blacktriangleright 0.3384$

	A	B	C	D
=				
1	x	p(x)	c_p(x)	
2	0	0.2486	0.2486	
3	1	0.399	0.6476	
4	2	0.2562	0.9038	
5	3	0.0822	0.986	
6	4	0.0132	0.9992	
7	5	0.0008	1.	
8				
9				
10				
11				

A1 *x*

33) Find w

Easiest way to find w

$0.9966+0.0032 \blacktriangleright 0.9998$

Another way to find

w= $1-0.0002=0.9998$

	A	B	C	D
=				
1	x	p(x)	c_p(x)	
2	0	0.4011	0.4011	
3	1	0.402	0.8031	
4	2	0.1612	0.9643	
5	3	0.0323	0.9966	
6	4	0.0032	w	0.9998
7	5	0.0002	1	
8				
9				
10				
11				

C9