

Multiple Choice:

- 1. B
- 2. C
- 3. A
- 4. C
- 5. A
- 6. B
- 7. A
- 8. C
- 9. C
- 10. D

Hint for 6

36 possibilities

	x	$P(x)$	$xP(x)$
lose 5	-5	$\frac{31}{36}$	$-\frac{155}{36}$
win 10	+5	$\frac{3}{36}$	$\frac{15}{36}$
win 20	+15	$\frac{2}{36}$	$\frac{30}{36}$
			$-\frac{110}{36}$
			-3.06

Sum of 10
Sum of 20

lose 5
win 10
win 20

x	$P(x)$
10	0.16
15	0.21
20	0.11
25	0.09
30	<input type="text"/>

} have to add to 1.

Pt B

1. Not a probability distribution because $P(x)$ cannot be negative.

2.

x	$P(x)$	$xP(x)$
1	0.42	0.42
2	0.58	1.16

$\mu = 1.58$

$\sum xP(x) = 1.58$

3.

x	$P(x)$	$xP(x)$	$x^2P(x)$
0	0.20	0	0
1	0.35	0.35	0.35
2	0.10	0.2	0.40
3	0.25	0.75	2.25
4	0.10	0.40	1.16
		1.7	4.6

$$\sigma = \sqrt{\sum x^2 P(x) - \mu^2}$$

$$= \sqrt{4.6 - 1.7^2}$$

$$= \sqrt{1.71}$$

$$= 1.31$$

4. ① fixed # trials
 ② each trial is independent
 ③ probability is the same for each trial
 ④ only two outcomes

5. $n = 5$
 $p = 0.5$ (heads) $q = 0.5$
 $x = 3$

$$P(x=3) = {}_5C_3 (0.5)^3 (0.5)^2 = 0.3125$$

6. Defective or not:
 $n = 200$
 $p = 0.015$ $q = 0.985$
 $x = 6$

$${}_{200}C_6 (0.015)^6 (0.985)^{194} = 0.050$$

7. $p = 0.60$
 $q = 0.40$
 $n = 20$

$$\sigma = \sqrt{n \cdot p \cdot q} = \sqrt{20(0.60)(0.40)} = 2.19$$

8. $n = 14$
 $p = 0.10$ (prob. of 1st grader)
 $q = 0.90$
 $\mu = n \cdot p$
 $= 14(0.10)$
 $= 1.4$

$\sigma = \sqrt{n \cdot p \cdot q}$
 $= \sqrt{14(0.10)(0.90)}$
 $= \sqrt{1.26}$
 $= 1.12$

9. $n = 12$
 $p = 0.48$
 $q = 0.52$

(a) $P(x=9) = {}_{12}C_9 (0.48)^9 (0.52)^3$
 $= 0.0418$

(b) prob 5 do not attempt
 method 1

7 do attempt

$$P(x=7) = {}_{12}C_7 (0.48)^7 (0.52)^5$$

$$= 0.177$$

Method 2

$p = 0.52$ (do not attempt)
 $q = 0.48$

$$P(x=5) = {}_{12}C_5 (0.52)^5 (0.48)^7$$

$$= 0.177$$

(c) At least 10 (this means 10, 11 or 12)

$$P(x=10) = {}_{12}C_{10} (0.48)^{10} (0.52)^2 = 0.0116$$

$$P(x=11) = {}_{12}C_{11} (0.48)^{11} (0.52)^1 = 0.00194$$

$$P(x=12) = {}_{12}C_{12} (0.48)^{12} (0.52)^0 = 0.0001496$$

0.0137

$$\begin{aligned}
 (d) \quad \mu &= n \cdot p & \sigma &= \sqrt{n \cdot p \cdot q} \\
 &= 12(0.48) & \sigma &= \sqrt{12(0.48)(0.52)} \\
 &= 5.76 & &= \sqrt{2.9952} \\
 & & &= 1.73
 \end{aligned}$$

10. same as multiple choice:

	x	P	$xP(x)$
(wins) #5	5	$\frac{3}{36}$	$\frac{15}{36}$
(wins) #15	15	$\frac{2}{36}$	$\frac{30}{36}$
(lose) #5	5	$\frac{31}{36}$	$-\frac{155}{36}$
			$\sum xP(x) = -3.06$

A bag contains 20 marbles:

6 Blue, 5 Red, 4 Green, 4 Yellow, 1 Purple.

You pay \$10 to draw a marble. What is the expectation of this game (Expected Value) aka: mean

You win: \$1 if you get yellow
 \$1 if you get Green
 \$20 if you get Purple

x	$P(x)$	$xP(x)$
-10	$\frac{11}{20}$	$-\frac{110}{20}$
-9	$\frac{8}{20}$	$-\frac{72}{20}$
+10	$\frac{1}{20}$	$\frac{10}{20}$
		$-\frac{172}{20}$

$$\mu = \sum xP(x)$$

$$= -8.60$$

