Answer Sheet

1	0.427 ✓	16	3.5 ✓
2	0.959 ✓	17	0.000 ✓
3	0.0625 ✓	18	0.000 ✓
4	0.9375 ✓	19	0.004 ✓
5	0.3125 ✓	20	0.004 ✓
6	0.9375 ✓	21	0.000 ✓
7	0.3125 ✓	22	4.6 ✓
8	—	23	0.002 ✓
9	2 ✓	24	0.013 ✓
10	$ - 3.20 ✓	25	0.039 ✓
11	0.008 ✓	26	0.985 ✓
12	0.055 ✓	27	0.985 ✓
13	0.992 ✓	28	0.135 ✓
14	0.227 ✓	29	0.918 ✓
15	0.773 ✓	30	0.999 ✓

29 ✓

East Los Angeles College
Department of Mathematics
Math 227
Test 3

Drinking based on Age Groups

The following table illustrates the drinking habits based on age groups. If you select a person at random, what's the probability of selecting a person: **Approximate your answer to the nearest thousandths**

	Age 21 to 31	**Age 32 to 42**	**Age 43 to 53**	**Age 54 to 64**	Total
Drink	58	69	53	41	221
Not Drink	32	38	29	18	117
Total	**90**	**107**	**82**	**59**	338

1. If you select two **different** people at random, what is the probability at least one is aged 43 to 53 years?
2. If you select three **different** people at random, what is the probability at least one drinks?

Four Children

Let x represent the number of girls a couple has when having four children. The following table illustrates the probability distribution associated with having boys.

x	P(x)
0	0.0625
1	0.25
2	0.375
3	0.25
4	0.0625

If you select a person at random, what's the probability the person has:
Approximate your answer to the nearest thousandths

3. No girls?
4. At least one girl?
5. More than two girls?
6. No more than three girls?
7. Less than two girls?
9. What is the mean for this distribution?

The Two Kings Game (Approximate to the nearest hundredths)

10. Las Vegas has a new gambling game called the **Two Kings**. In order to win this game, all you need to do is select two different Kings from a standard deck. If it cost's $ 5 for a chance to win $400, compute the expected value for this game.

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7 Children (Approximate to the nearest Thousandths)

A couple plans on having 6-children. What is the probability the couple has:

11. No girls?
12. One girl?
13. At least one girl?
14. No more than two girls?
15. More than two girls?
16. What is the expected number of girls?

Fax Machine (Approximate to the nearest Thousandths)

A machine uses 5 special components in copying a document. If probability that each component functions is 0.92 and these components function independently of one another. What is the probability that:

17. No components function?
18. One component functions?
19. Two components function?
20. Less than three components function?
21. More than five components function?
22. What is the expected number of components that will function?

Murders in Friedman City (Approximate to the nearest Thousandths)

Friedman City experiences a mean of 6.2 murders per week (7 days). In the next week, what is the probability Friedman City will have:

23. No murders?
24. One murder>
25. Two murders?
26. At least two murders?
27. More than one murder?
28. No more than three murders?
29. In the next month (5-days) what is the probability Friedman City experiences more than two murders?
30. In the next month (10-days) what is the probability Friedman City experiences more than one murder?

math 227 Test 3

(1) p(at least one 43-53)

$= 1 - p(\text{none are } 43\text{-}53)$

$= 1 - p(\text{1st not } 43\text{-}53 \text{ and } \text{2nd not } 43\text{-}53)$

$= 1 - p(\text{1st not } 43\text{-}53) \cdot p(\text{2nd not } 43\text{-}53)$

$= 1 - \frac{256}{338} \cdot \frac{255}{337} \approx \boxed{0.427}$

(2) p(at least one drinks)

$= 1 - p(\text{none drink})$

$= 1 - p(\text{1st not D and 2nd not D and 3rd not D})$

$= 1 - p(\text{1st not D}) \cdot p(\text{2nd not D}) \cdot p(\text{3rd not D})$

$= 1 - \frac{117}{338} \cdot \frac{116}{337} \cdot \frac{115}{336} \approx \boxed{0.959}$

(3) $p(0) = 0.0625$

(4) at least one; $x \geq 1$

$p(\text{at least one}) = p(x \geq 1) = 1 - p(0)$

$= 1 - 0.0625 = \boxed{0.9375}$

(5) more than two $\quad x > 2$

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

$$0.25 + 0.0625$$

$$= \boxed{0.3125}$$

(6) No more than three $\quad x \leq 3$

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

$$= 1 - P(4)$$

$$= 1 - 0.0625$$

$$= \boxed{0.9375}$$

(7) less than two

$x < 2$

$$P(x < 2) = P(0) + P(1)$$

$$0.0625 + 0.25$$

$$= \boxed{0.3125}$$

(9) $\mu = \sum_{\text{all } x} x\, p(x) = 0 \cdot 0.0625 + 1 \cdot 0.25$

$+ 2 \cdot 0.375 + 3 \cdot 0.25$

$+ 4 \cdot 0.0625 \simeq \boxed{2}$

x		P(x)	
(10) outcomes		probability	x P(x)
395	win	$\frac{4}{52} \cdot \frac{3}{51}$ 0.0045	395 · 0.0045
−5	lose	$1 - \frac{4}{52} \cdot \frac{3}{51}$ 0.9955	−5 · 0.9955

$\mu = 395 \cdot 0.0045 - 5 \cdot 0.9955$

$\mu = -3.20$ $

(11) $n = 7$ Seven children

$x = 0$; $P(x) = {}_nC_x \, p^x \, (1-p)^{n-x}$

$p = 0.5$ $P(0) = {}_7C_0 \, 0.5^0 \, 0.5^{7-0}$

$1 - p = 0.5$ $P(0) = {}_7C_0 \cdot 1 \cdot 0.5^7$

$P(0) = 0.5^7 \approx \boxed{0.008}$

(12) $x = 1$; $P(1) = {}_7C_1 \, 0.5^1 \, 0.5^{7-1}$

$= 7 \cdot 0.5^1 \, 0.5^6$

$= 7 \cdot 0.5^7 \approx \boxed{0.055}$

(13) at least one $x \geq 1$

$P(x \geq 1) = 1 - P(0) = 1 - 0.008 = \boxed{0.992}$

(15) $x > 2$

$$P(x>2) = P(3) + P(4) + P(5) + P(6) + P(7)$$

$$= 1 - P(0) - P(1) - P(2)$$

$$= 1 - 0.008 - 0.055 - 0.164$$

nok $\quad P(2) = {}^{7}C_2 \, 0.5^2 \, 0.5^{7-2}$

$$= {}^{7}C_2 \, 0.5^7$$

$$= 21 \cdot 0.5^7 \approx 0.164$$

$$\approx \boxed{0.773}$$

(14) $x \leq 2$

$$P(x \leq 2) = P(0) + P(1) + P(2)$$

$$= 0.008 + 0.055 + 0.164$$

$$= \boxed{0.227}$$

(16) $\mu = np$; $\mu = 7 \cdot 0.5$; $\boxed{\mu = 3.5}$

(17) $n = 5$ $\quad P(\text{functions}) = 0.92$

ie, $p = 0.92$ $\quad q = 1 - p$

$q = 1 - 0.92$

$q = 0.08$

$x = 0$

$$P(x) = n\,C_x\, p^x\, q^{n-x}$$

$$P(0) = 5\,C_0\; 0.92^0\; 0.08^{5-0}$$

$$= 1 \cdot 0.92^0 \cdot 0.08^5$$

$$= 0.08^5 \approx 0.0000003$$

$$\approx \boxed{0.000}$$

(18) $x = 1$; $n = 5$, $p = 0.92$

$$P(1) = 5\,C_1\; 0.92^1\; 0.08^{5-1}$$

$$P(1) = 5 \cdot 0.92 \cdot 0.08^4$$

$$\approx 0.0002 \approx \boxed{0.000}$$

(19) $x = 2$

$$P(2) = 5\,C_2\; 0.92^2\; 0.08^{5-2}$$

$$= 5\,C_2\; 0.92^2\; 0.08^3$$

$$\approx \boxed{0.004}$$

(20) $x < 3$

$$P(x<3) = P(0) + P(1) + P(2)$$

$$\approx 0.000 + 0.000 + 0.004 \approx \boxed{0.004}$$

(21) $x > 5$

$$P(x > 5) = P(6) + P(7) + \cdots$$

$$= \boxed{0.000}$$

(22) $\mu = np$

$$\mu = 5 \cdot 0.92$$

$$\boxed{\mu = 4.6}$$

(23) $\mu = 6.2$

$$x = 0 \; ; \; P(x) = \frac{\mu^x e^{-\mu}}{x!}$$

$$P(0) = \frac{6.2^0 e^{-6.2}}{0!}$$

$$= e^{-6.2} \approx \boxed{0.002}$$

(24) $x = 1$

$$P(1) = \frac{6.2^1 e^{-6.2}}{1!}$$

$$= 6.2 e^{-6.2}$$

$$\approx \boxed{0.013}$$

(25) $x = 2 \; ; \; P(2) = \frac{6.2^2 e^{-6.2}}{2!}$

$$\approx \boxed{0.039}$$

(26) at least two

$x \geq 2$

$$P(x \geq 2) = P(2) + P(3) + \dots$$

$$= 1 - P(0) - P(1)$$

$$= 1 - 0.002 - 0.013$$

$$\therefore \boxed{0.985}$$

(27) $x > 1$

$$P(x > 1) = P(2) + P(3) + \dots$$

$$= 1 - P(0) - P(1)$$

$$= 1 - 0.002 - 0.013$$

$$= \boxed{0.985}$$

(28) $x \leq 3$

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

$$= 0.002 + 0.013 + 0.039$$

$$+ P(3)$$

note $P(3) = \frac{6.2^3 e^{-6.2}}{3!}$

≈ 0.081

$= 0.002 + 0.013 + 0.039 + 0.081$

$\approx \boxed{0.135}$

(29) $\frac{6.2}{7d} = \frac{\mu}{5d}$; $\mu = \frac{5 \cdot 6.2}{7}$

$\mu \approx 4.429$

$P(x) = \frac{\mu^x e^{-\mu}}{x!}$

$P(x) = \frac{4.429^{x} e^{-4.429}}{x!}$

$x > 2$; $P(x>2) = P(3) + P(4) + \cdots$

$= 1 - P(0) - P(1) - P(2)$

$= \boxed{0.818}$

(30) $\frac{6.2}{7} = \frac{\mu}{10}$; $\mu = \frac{10 \cdot 6.2}{7}$

$\mu \approx 8.857$

$$P(x) = \frac{\mu^x e^{-\mu}}{x!}$$

$$P(x) = \frac{8.857^x e^{-8.857}}{x!}$$

$x > 1$; $P(x>1) = P(2) + P(3) + \ldots$

$= 1 - P(0) - P(1)$

$= \boxed{0.999}$