Probability Distributions Solutions

The following probability distribution represents the number of children students have in a Math 227 course.

Let x represent the number of children.

х	p(x)
0	0.364
1	0.227
2	0.182
3	0.136
4	0.091

x = # of children

1

If you select a person at random, what's the probability the person has:

1. More than one child?

	x	p(x)	TEXAS INSTRUMENTS TI-84 Plus CE
	0	0.364	.182+.136+.091
	1	0.227	0.409
	2	0.182	
	3	0.136	
	4	0.091	
Total		1	statplot f1tblset f2format f3calcf4tablef5y=windowzoomtracegraph

2. No more than two children?

	x	p(x)	NORMAL FLOAT AUTO REAL DEGREE MP
	0	0.364	.364+.227+.182
	1	0.227	0.773
	2	0.182	
	3	0.136	
	4	0.091	
			activity fit thisset f2 format f2 and a fit table f5
Total		1	y= window zoom trace graph

3. At least one child?

	x	p(x)	TEXAS INSTRUMENTS TI-84 Plus CE
	0	0.364	1364
	1	0.227	0,636
	2	0.182	
	3	0.136	
	4	0.091	
Total		1	statplot f1 tblset f2 format f3 calc f4 table f5 y= window zoom trace graph

4. Less than three children?

	X	p(x)	TEXAS INSTRUMENTS TI-84 Plus CE
	0	0.364	.364+.227+.182
	1	0.227	0.773
	2	0.182	
	3	0.136	
	4	0.091	
			statolot f1 tblset f2 format f3 calc f4 table f5
Total		1	y= window zoom trace graph

5. At least two children?

	x	p(x)	W TEXAS INSTRUMENTS TI-84 Plus CE
	0	0.364	1364227
	1	0.227	0.409
	2	0.182	
	3	0.136	
	4	0.091	
Total		1	statplot f1tblsetf2formatf3calcf4tablef5y=windowzoomtracegraph

6. Between one and three children?

			The A Dive OF
	x	p(x)	NORMAL FLOAT AUTO REAL DEGREE MP
	0	0.364	.227+.182+.136
	1	0.227	0.545 ■
	2	0.182	
	3	0.136	
	4	0.091	
Total		1	statplot f1tblsetf2formatf3calcf4tablef5y=windowzoomtracegraph

7. What is the mean for this distribution? **Approximate to the nearest tenths**

	x	p(x)	xp(x)
	0	0.364	0.000
	1	0.227	0.227
	2	0.182	0.364
	3	0.136	0.408
	4	0.091	0.364
Total		1	1.363

 $\mu \approx 1.4$

8. What is the standard deviation for this distribution?

Approximate to the nearest tenths

	x	p(x)	xp(x)	x^2p(x)
	0	0.364	0.000	0.000
	1	0.227	0.227	0.227
	2	0.182	0.364	0.728
	3	0.136	0.408	1.224
	4	0.091	0.364	1.456
Total		1	1.363	3.635

TEXAS INSTRUMENTS	TI-84 Plus CE
√3.635 −1.363 ²	1.333128276
statplot f1 tblset f2 format f y= window zoom	3 calc f4 table f5 trace graph

 $\sigma = \sqrt{3.635 - 1.363^2} \approx 1.3$

The following probability distribution represents the hours of sleep students get the night before an exam.

Let x represent the hours of sleep

x = # of hours of sleep

x	p(x)
0	0.071
1	0.048
2	0.024
3	0.024
4	0.119
5	0.143
6	0.190
7	0.286
8	0.095

Total

1.000

If you select a person from this table, What's the probability the person slept for:

	x	p(x)	TEXAS INSTRUMENTS TI-84 Plus CE
	0	0.071	NORMAL FLOAT AUTO REAL DEGREE MP
	1	0.048	1071
	2	0.024	0.929
	3	0.024	
	4	0.119	
	5	0.143	
	6	0.190	
	7	0.286	
	8	0.095	
			statplot f1 tblset f2 format f3 calc f4 table f5
Total		1.000	y= window zoom trace graph

9. At least one hour?

10. At least three hours?

	x	p(x)	TEXAS INSTRUMENTS TI-84 Plus CE
	0	0.071	NORMAL FLOAT AUTO REAL DEGREE MP
	1	0.048	1071048024
	2	0.024	Ø.857
	3	0.024	
	4	0.119	
	5	0.143	
	6	0.190	
	7	0.286	
	8	0.095	
			statplot f1 tblset f2 format f3 calc f4 table f5
Total		1.000	y= window zoom trace graph

11. More than seven hours?

	x	p(x)	TI-84 Plus CE
	0	0.071	NORMAL FLOAT AUTO REAL DEGREE MP
	1	0.048	.095
	2	0.024	0.095
	3	0.024	
	4	0.119	
	5	0.143	
	6	0.190	
	7	0.286	
	8	0.095	
			statplot f1 tblset f2 format f3 calc f4 table f5
Total		1.000	y= window zoom trace graph

12. No more than four hours?

	x	p(x)	TEXAS INSTRUMENTS TI-84 Plus CE
	0	0.071	NORMAL FLOAT AUTO REAL DEGREE MP
	1	0.048	.071+.048+.024+.024+.119
	2	0.024	0.286
	3	0.024	
	4	0.119	
	5	0.143	
	6	0.190	
	7	0.286	
	8	0.095	
			statplot f1 tblset f2 format f3 calc f4 table f5
Total		1.000	y= window zoom trace graph

13. Less than two hours?

	x	p(x)	TI-84 Plus CE
	0	0.071	NORMAL FLOAT AUTO REAL DEGREE MP
	1	0.048	. 071+. 048
	2	0.024	0.119
	3	0.024	
	4	0.119	
	5	0.143	
	6	0.190	
	7	0.286	
	8	0.095	
			statplot f1 tblset f2 format f3 calc f4 table f5
Total		1.000	y= window zoom trace graph

14. Between five and eight hours?

	x	p(x)	TEXAS INSTRUMENTS TI-84 Plus CE
	0	0.071	NORMAL FLOAT AUTO REAL DEGREE MP
	1	0.048	. 143+. 190+. 286+. 095
	2	0.024	0.714
	3	0.024	
	4	0.119	
	5	0.143	
	6	0.190	
	7	0.286	
	8	0.095	
			statplot f1 tblset f2 format f3 calc f4 table f5
Total		1.000	y= window zoom trace graph

15. What is the mean for this distribution? **Approximate to the nearest tenths**

	x	p(x)	xp(x)
	0	0.071	0
	1	0.048	0.048
	2	0.024	0.048
	3	0.024	0.072
	4	0.119	0.476
	5	0.143	0.715
	6	0.190	1.14
	7	0.286	2.002
	8	0.095	0.76
Total		1.000	5.261

 $\mu \approx 5.3$

16. What is the standard deviation for this distribution? **Approximate to the nearest tenths**

	x	p(x)	xp(x)	x^2p(x)
	0	0.071	0	0
	1	0.048	0.048	0.048
	2	0.024	0.048	0.096
	3	0.024	0.072	0.216
	4	0.119	0.476	1.904
	5	0.143	0.715	3.575
	6	0.190	1.14	6.84
	7	0.286	2.002	14.014
	8	0.095	0.76	6.08
Total		1.000	5.261	32.773



 $\sigma = \sqrt{32.773 - 5.261^2} \approx 1.3$

The following probability distribution represents the number of boys a couple has when having **5 children**.

Let x represent the number of boys

х	P(x)
0	0.024
0	0.031
1	0.156
2	0.313
3	0.313
4	0.156
5	0.031

x = # of boys

Total

1.000

If you select a couple at random, what's the probability the couple has: 17. At least one boy?

	x	P(x)	
	0	0.031	
	1	0.156	0.969
	2	0.313	_
	3	0.313	
	4	0.156	_
	5	0.031	_
			statplot f1 tblset f2 format f3 calc f4 table f5
Total		1.000	y= window zoom trace graph

18. At least four boys?



19. More than three boys?



20. No more than two boys?

	x	P(x)	TEXAS INSTRUMENTS TI-84 Plus CE
	0	0.031	NORMAL FLOAT AUTO REAL DEGREE MP
	1	0.156	0.5
	2	0.313	-
	3	0.313	
	4	0.156	
	5	0.031	
			statplot f1 tblset f2 format f3 calc f4 table f5
Total		1.000	y= window zoom trace graph

21. Less than one boy?



22. Between one and four boys?

	x	P(x)	TEXAS INSTRUMENTS TI-84 Plus CE
	0	0.031	NORMAL FLOAT AUTO REAL DEGREE MP
	1	0.156	.156+.313+.313+.156 0.938
	2	0.313	•
	3	0.313	
	4	0.156	
	5	0.031	
			statplot f1 tblset f2 format f3 calc f4 table f5
Total		1.000	y= window zoom trace graph

23. What is the mean for this distribution? **Approximate to the nearest tenths**

	x	P(x)	xp(x)	
	0	0.031	0	
	1	0.156	0.156	
	2	0.313	0.626	
	3	0.313	0.939	
	4	0.156	0.624	
	5	0.031	0.155	
Total		1.000	2.5	

 $\mu \approx 2.5$

24. What is the standard deviation for this distribution? **Approximate to the nearest tenths**

	x	P(x)	xp(x)	x^2p(x)
	0	0.031	0	0
	1	0.156	0.156	0.156
	2	0.313	0.626	1.252
	3	0.313	0.939	2.817
	4	0.156	0.624	2.496
	5	0.031	0.155	0.775
Total		1.000	2.5	7.496

TEXAS INSTRUMENTS	TI-84 Plus CE
NORMAL FLOAT AUTO REAL	DEGREE MP
√7.496-2.5 ²	1.116243701
-	
statolot f1 tblset f2 format t	13 calc f4 table f5
y= window zoom	trace graph

 $\boldsymbol{\sigma} = \sqrt{7.496 - 2.5^2} \approx 1.1$

The following probability distribution represents the number of boys a couple has when having **4 children**.

Let x represent the number of girls

х	p(x)
0	0.063
1	0.25
2	0.375
3	0.25
4	0.063

x = # of girls

Total

1.001

If you select a couple at random, what's the probability the couple has: 25. At least one girl?

	x	p(x)	TEXAS INSTRUMENTS TI-84 Plus CE
	0	0.063	NORMAL FLOAT AUTO REAL DEGREE MP
	1	0.25	0.937
	2	0.375	
	3	0.25	
	4	0.063	
Total		1.001	statplot f1tblsetf2formatf3calcf4tablef5y=windowzoomtracegraph

26. At least two girls?

	x	p(x)	TEXAS INSTRUMENTS TI-84 Plus CE
	0	0.063	106325
	1	0.25	0.687
	2	0.375	
	3	0.25	
	4	0.063	
Total		1.001	statplot f1 tblset f2 format f3 calc f4 table f5 y= window zoom trace graph

27. More than one girl?

	x	p(x)	TEXAS INSTRUMENTS TI-84 Plus CE
	0	0.063	NURMHL FLOHT HUTO KEHL DEGREE MP
	1	0.25	0.688
	2	0.375	
	3	0.25	
	4	0.063	
Total		1.001	y= window zoom trace graph

28. No more than two girls?

	x	p(x)
	0	0.063
	1	0.25
	2	0.375
	3	0.25
	4	0.063
Total		1.001

NORMAL FLOAT AUTO REAL DEG	REE MP
.063+.25+.375	0.688
statplot f1 tblset f2 format f3 ca	Ic f4 table f5

29. Less than four girls?

	x	p(x)	TEXAS INSTRUMENTS TI-84 Plu
	0	0.063	062+ 25+ 375+ 25
	1	0.25	0.9
	2	0.375	
	3	0.25	
	4	0.063	
otal		1.001	y= window zoom trace gr

30. Between two and four girls?

	x	p(x)	TEXAS INSTRUMENTS TI-84 Plus CE
	0	0.063	.375+.25+.063
	1	0.25	Ø.688. ■
	2	0.375	
	3	0.25	
	4	0.063	
			statolot f1 tblset f2 format f3 calc f4 table f5
Total		1.001	y= window zoom trace graph

31. What is the mean for this distribution? **Approximate to the nearest tenths**

	x	p(x)	xp(x)
	0	0.063	0
	1	0.25	0.25
	2	0.375	0.75
	3	0.25	0.75
	4	0.063	0.252
Total		1.001	2.002

 $\mu \approx 2.0$

32. What is the standard deviation for this distribution? **Approximate to the nearest tenths**

	x	p(x)	xp(x)	x^2p(x)
	0	0.063	0	0
	1	0.25	0.25	0.25
	2	0.375	0.75	1.5
	3	0.25	0.75	2.25
	4	0.063	0.252	1.008
Total		1.001	2.002	5.008



σ	= \	5.	008	- 2 .	002 ²	\approx	1.0
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Red Aces Game

It costs \$5.00 for a chance to win \$50.00 in the red aces game. All you must do is select a red ace when picking a card at random.

Approximate your answer to the nearest hundredths

TEXAS INSTRUMENTS	TI-84 Plus CE
2/52 1-2/52	.0.0384615385
	0.9615384615
statplot f1 tblset f2 form	at f3 calc f4 table f5 om trace graph

	x		p(x)		
	Amount	Outcome	Probability	xp(x)	
	45	win	0.038	1.71	
	-5	Lose	0.962	-4.81	
Total				-3.1	

33. What is the cost of losing for this game?

-5.00

34. What is the net amount for winning this game?

45.00

35. What's the probability of winning this game?

$$\frac{2}{52}\approx 0.038$$

36. What's the probability of losing this game?

$$1-\frac{2}{52}\approx 0.962$$

37. What is the expected value for this game?

$$\mu\approx 1.71-4.81\approx 3.10$$