

Math 221: Basic Statistics Exam #1 Solutions

Week #6

- | | | |
|--|--|--|
| (1) (a) Quantitative, Discrete
(b) Qualitative, Nominal
(c) Quantitative, Continuous
(d) Qualitative, Ordinal | (a) Qualitative, Nominal
(b) Qualitative, Ordinal
(c) Quantitative, Discrete
(d) Quantitative, Continuous | (a) Quantitative, Discrete
(b) Qualitative, Nominal
(c) Qualitative, Ordinal
(d) Quantitative, Continuous |
| (2) (a) American Adults
(b) phone survey
(c) 1,004 randomly selected adults
(d) See Class Discussion | (a) American Catholics
(b) phone survey
(c) 665+694 randomly selected catholics
(d) See Class Discussion | (a) American Adults
(b) phone survey
(c) 1,004 randomly selected adults
(d) See Class Discussion |

	Version A			Version B			Version C		
Month	Sales	R.Freq.	C.Freq.	Sales	R.Freq.	C.Freq.	Sales	R.Freq.	C.Freq.
January	65	7.03%	7.03%	70	7.11%	7.11 %	60	6.94%	6.94 %
February	61	6.60%	13.64%	66	6.71%	13.82%	56	6.48%	13.43%
March	70	7.58%	21.21%	75	7.62%	21.44%	65	7.52%	20.95%
April	74	8.01%	29.22%	79	8.03%	29.47%	69	7.99%	28.94%
May	72	7.79%	37.01%	77	7.83%	37.30%	67	7.75%	36.69%
(3) June	80	8.66%	45.67%	85	8.64%	45.93%	75	8.68%	45.37%
July	88	9.52%	55.19%	93	9.45%	55.39%	83	9.61%	54.98%
August	93	10.06%	65.26%	98	9.96%	65.35%	88	10.19%	65.16%
September	91	9.85%	75.11%	96	9.76%	75.10%	86	9.95%	75.12%
October	78	8.44%	83.55%	83	8.43%	83.54%	73	8.45%	83.56%
November	68	7.36%	90.91%	73	7.42%	90.96%	63	7.29%	90.86%
December	84	9.09%	100%	89	9.04%	100%	79	9.14%	100%
Total	924	100%		984	100%		864	100%	

- | (4) (a) $\frac{102-69}{5} = 8.4$
Class Width=9
63,72,81,90,99,108.
<table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <tr><th>Class</th><th>freq.</th><th>Cumul.%</th></tr> <tr><td>63-72</td><td>9</td><td>36%</td></tr> <tr><td>72-81</td><td>4</td><td>52%</td></tr> <tr><td>81-90</td><td>5</td><td>72%</td></tr> <tr><td>90-99</td><td>5</td><td>92%</td></tr> <tr><td>99-108</td><td>2</td><td>100%</td></tr> <tr><td>Total</td><td>25</td><td></td></tr> </table> (b) | Class | freq. | Cumul.% | 63-72 | 9 | 36% | 72-81 | 4 | 52% | 81-90 | 5 | 72% | 90-99 | 5 | 92% | 99-108 | 2 | 100% | Total | 25 | | (a) $\frac{105-63}{5} = 8.4$
Class Width=9
60,69,78,87,96,105.
<table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <tr><th>Class</th><th>freq.</th><th>Cumul.%</th></tr> <tr><td>60-69</td><td>9</td><td>36%</td></tr> <tr><td>69-78</td><td>4</td><td>52%</td></tr> <tr><td>78-87</td><td>5</td><td>72%</td></tr> <tr><td>87-96</td><td>5</td><td>92%</td></tr> <tr><td>96-105</td><td>2</td><td>100%</td></tr> <tr><td>Total</td><td>25</td><td></td></tr> </table> (b) | Class | freq. | Cumul.% | 60-69 | 9 | 36% | 69-78 | 4 | 52% | 78-87 | 5 | 72% | 87-96 | 5 | 92% | 96-105 | 2 | 100% | Total | 25 | | (a) $\frac{108-66}{5} = 8.4$
Class Width=9
66,75,84,93,102,111.
<table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <tr><th>Class</th><th>freq.</th><th>Cumul.%</th></tr> <tr><td>66-75</td><td>9</td><td>36%</td></tr> <tr><td>75-84</td><td>4</td><td>52%</td></tr> <tr><td>84-93</td><td>5</td><td>72%</td></tr> <tr><td>93-102</td><td>5</td><td>92%</td></tr> <tr><td>102-111</td><td>2</td><td>100%</td></tr> <tr><td>Total</td><td>25</td><td></td></tr> </table> (b) | Class | freq. | Cumul.% | 66-75 | 9 | 36% | 75-84 | 4 | 52% | 84-93 | 5 | 72% | 93-102 | 5 | 92% | 102-111 | 2 | 100% | Total | 25 | |
|---|--|--|---------|-------|---|-----|-------|---|-----|-------|---|-----|-------|---|-----|--------|---|------|-------|----|--|---|-------|-------|---------|-------|---|-----|-------|---|-----|-------|---|-----|-------|---|-----|--------|---|------|-------|----|--|--|-------|-------|---------|-------|---|-----|-------|---|-----|-------|---|-----|--------|---|-----|---------|---|------|-------|----|--|
| Class | freq. | Cumul.% | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 63-72 | 9 | 36% | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 72-81 | 4 | 52% | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 81-90 | 5 | 72% | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 90-99 | 5 | 92% | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 99-108 | 2 | 100% | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Total | 25 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Class | freq. | Cumul.% | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 60-69 | 9 | 36% | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 69-78 | 4 | 52% | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 78-87 | 5 | 72% | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 87-96 | 5 | 92% | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 96-105 | 2 | 100% | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Total | 25 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Class | freq. | Cumul.% | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 66-75 | 9 | 36% | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 75-84 | 4 | 52% | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 84-93 | 5 | 72% | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 93-102 | 5 | 92% | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 102-111 | 2 | 100% | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Total | 25 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| (5) (a) 63,63,66,67,69,70,70,71,71,72,
72,74,75,84,85,85,85,86,90,90,
91,94,95,104,105.
(b) Midrange = 84
Median = 75
Mean = 79.88
Mode = 85. | (a) 60,60,63,64,66,67,67,68,68,69,
69,71,72,81,82,82,82,83,87,87,
88,91,92,101,102.
(b) Midrange = 81
Median = 72
Mean = 76.88
Mode = 82 | (a) 66,66,69,70,72,73,73,74,74,75,
75,77,78,87,88,88,88,89,93,93,
94,97,98,107,108.
(b) Midrange = 81
Median = 72
Mean = 76.88
Mode = 82 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

	A	B	C
$\sum x$	104	104	102
$\sum x^2$	764	776	760
\bar{x}	6.933	6.933	6.80
$s^2 = \text{Var}(X)$	3.067	3.923	4.743
s	1.751	1.981	2.178

		Version A			Version B			Version C		
Distance	Midpoints	f	xf	x^2f	f	xf	x^2f	f	xf	x^2f
1.0-3.0	2	2	4	8	4	8	16	6	12	24
3.0-5.0	4	6	24	96	8	32	128	7	28	112
5.0-7.0	6	12	72	432	6	36	216	7	42	252
7.0-9.0	8	50	400	3200	45	360	2880	40	320	2560
9.0-11.0	10	35	350	3500	40	400	4000	45	450	4500
11.0-13.0	12	15	180	2160	15	180	2160	15	180	2160
13.0-15.0	14	5	70	980	5	70	980	5	70	980
Totals		125	1100	10376	123	1086	10380	125	1102	10588
Answers		\bar{x}	$\text{Var}(X)$	s	\bar{x}	$\text{Var}(X)$	s	\bar{x}	$\text{Var}(X)$	s
		8.800	5.613	2.369	8.829	6.487	2.547	8.816	7.038	2.653

(8) $n = 30$, $Q_1 = P_{25} = \frac{25(30)}{100} = 7.5 \Rightarrow 8^{\text{th}}$, $P_{50} = \frac{50(30)}{100} = 15 \Rightarrow 15.5 = \frac{15^{\text{th}} + 16^{\text{th}}}{2}$,
 $Q_3 = P_{75} = \frac{75(30)}{100} = 22.5 \Rightarrow 23^{\text{rd}}$, $P_{27} = \frac{27(30)}{100} = 8.1 \Rightarrow 9^{\text{th}}$, $P_{90} = \frac{90(30)}{100} = 27 \Rightarrow 27.5 = \frac{27^{\text{th}} + 28^{\text{th}}}{2}$.

	A	B	C
Min	10	17.7	13.86
Q₁	26.96	35.75	33.65
Median	38.365	42.21	44.46
Q₃	49.54	51.4	55.68
Max	126.15	100.78	127
P₂₇	28.29	37	34.67
P₉₀	70.365	69.995	75.705