

Table of z values and probabilities for the standard normal distribution. z is the first column plus the top row. Each cell shows $P(X \leq z)$. For example $P(X \leq 1.04) = .8508$. For $z < 0$ subtract the value from 1, e.g., $P(X \leq -1.04) = 1 - .8508 = .1492$.

z	0	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0	0.5000	0.5040	0.5080	0.5120	0.5160	0.5199	0.5239	0.5279	0.5319	0.5359
0.1	0.5398	0.5438	0.5478	0.5517	0.5557	0.5596	0.5636	0.5675	0.5714	0.5753
0.2	0.5793	0.5832	0.5871	0.5910	0.5948	0.5987	0.6026	0.6064	0.6103	0.6141
0.3	0.6179	0.6217	0.6255	0.6293	0.6331	0.6368	0.6406	0.6443	0.6480	0.6517
0.4	0.6554	0.6591	0.6628	0.6664	0.6700	0.6736	0.6772	0.6808	0.6844	0.6879
0.5	0.6915	0.6950	0.6985	0.7019	0.7054	0.7088	0.7123	0.7157	0.7190	0.7224
0.6	0.7257	0.7291	0.7324	0.7357	0.7389	0.7422	0.7454	0.7486	0.7517	0.7549
0.7	0.7580	0.7611	0.7642	0.7673	0.7704	0.7734	0.7764	0.7794	0.7823	0.7852
0.8	0.7881	0.7910	0.7939	0.7967	0.7995	0.8023	0.8051	0.8078	0.8106	0.8133
0.9	0.8159	0.8186	0.8212	0.8238	0.8264	0.8289	0.8315	0.8340	0.8365	0.8389
1	0.8413	0.8438	0.8461	0.8485	0.8508	0.8531	0.8554	0.8577	0.8599	0.8621
1.1	0.8643	0.8665	0.8686	0.8708	0.8729	0.8749	0.8770	0.8790	0.8810	0.8830
1.2	0.8849	0.8869	0.8888	0.8907	0.8925	0.8944	0.8962	0.8980	0.8997	0.9015
1.3	0.9032	0.9049	0.9066	0.9082	0.9099	0.9115	0.9131	0.9147	0.9162	0.9177
1.4	0.9192	0.9207	0.9222	0.9236	0.9251	0.9265	0.9279	0.9292	0.9306	0.9319
1.5	0.9332	0.9345	0.9357	0.9370	0.9382	0.9394	0.9406	0.9418	0.9429	0.9441
1.6	0.9452	0.9463	0.9474	0.9484	0.9495	0.9505	0.9515	0.9525	0.9535	0.9545
1.7	0.9554	0.9564	0.9573	0.9582	0.9591	0.9599	0.9608	0.9616	0.9625	0.9633
1.8	0.9641	0.9649	0.9656	0.9664	0.9671	0.9678	0.9686	0.9693	0.9699	0.9706
1.9	0.9713	0.9719	0.9726	0.9732	0.9738	0.9744	0.9750	0.9756	0.9761	0.9767
2	0.9772	0.9778	0.9783	0.9788	0.9793	0.9798	0.9803	0.9808	0.9812	0.9817
2.1	0.9821	0.9826	0.9830	0.9834	0.9838	0.9842	0.9846	0.9850	0.9854	0.9857
2.2	0.9861	0.9864	0.9868	0.9871	0.9875	0.9878	0.9881	0.9884	0.9887	0.9890
2.3	0.9893	0.9896	0.9898	0.9901	0.9904	0.9906	0.9909	0.9911	0.9913	0.9916
2.4	0.9918	0.9920	0.9922	0.9925	0.9927	0.9929	0.9931	0.9932	0.9934	0.9936
2.5	0.9938	0.9940	0.9941	0.9943	0.9945	0.9946	0.9948	0.9949	0.9951	0.9952
2.6	0.9953	0.9955	0.9956	0.9957	0.9959	0.9960	0.9961	0.9962	0.9963	0.9964
2.7	0.9965	0.9966	0.9967	0.9968	0.9969	0.9970	0.9971	0.9972	0.9973	0.9974
2.8	0.9974	0.9975	0.9976	0.9977	0.9977	0.9978	0.9979	0.9979	0.9980	0.9981
2.9	0.9981	0.9982	0.9982	0.9983	0.9984	0.9984	0.9985	0.9985	0.9986	0.9986
3	0.9987	0.9987	0.9987	0.9988	0.9988	0.9989	0.9989	0.9989	0.9990	0.9990

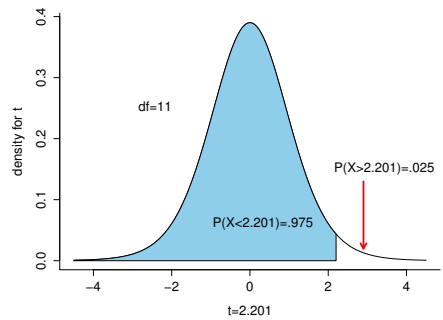


Table of t values and right tail probabilities. Degrees of freedom are in the first column (df). **Right tail probabilities** are in the first row. For example for $d.f. = 7$ and $\alpha = .05$ the critical t value for a two-tail test is 2.365 and for $d.f. = 10$ and $\alpha = .1$ the critical t value for a one-tail test is 1.372.

df	.1	.05	.025	.01	.005
1	3.078	6.314	12.706	31.821	63.657
2	1.886	2.920	4.303	6.965	9.925
3	1.638	2.353	3.182	4.541	5.841
4	1.533	2.132	2.776	3.747	4.604
5	1.476	2.015	2.571	3.365	4.032
6	1.440	1.943	2.447	3.143	3.707
7	1.415	1.895	2.365	2.998	3.499
8	1.397	1.860	2.306	2.896	3.355
9	1.383	1.833	2.262	2.821	3.250
10	1.372	1.812	2.228	2.764	3.169
11	1.363	1.796	2.201	2.718	3.106
12	1.356	1.782	2.179	2.681	3.055
13	1.350	1.771	2.160	2.650	3.012
14	1.345	1.761	2.145	2.624	2.977
15	1.341	1.753	2.131	2.602	2.947
16	1.337	1.746	2.120	2.583	2.921
17	1.333	1.740	2.110	2.567	2.898
18	1.330	1.734	2.101	2.552	2.878
19	1.328	1.729	2.093	2.539	2.861
20	1.325	1.725	2.086	2.528	2.845
21	1.323	1.721	2.080	2.518	2.831
22	1.321	1.717	2.074	2.508	2.819
23	1.319	1.714	2.069	2.500	2.807
24	1.318	1.711	2.064	2.492	2.797
25	1.316	1.708	2.060	2.485	2.787
26	1.315	1.706	2.056	2.479	2.779
27	1.314	1.703	2.052	2.473	2.771
28	1.313	1.701	2.048	2.467	2.763
29	1.311	1.699	2.045	2.462	2.756
30	1.310	1.697	2.042	2.457	2.750
40	1.303	1.684	2.021	2.423	2.704
50	1.299	1.676	2.009	2.403	2.678
75	1.293	1.665	1.992	2.377	2.643
100	1.290	1.660	1.984	2.364	2.626

Table of F values for right tail probabilities of .05. Degrees of freedom for denominator are in the first column and degrees of freedom for the numerator are in the top row.

denom.	numerator df									
df	1	2	3	4	5	7	10	15	50	100
1	161.45	199.5	215.71	224.58	230.16	236.77	241.88	245.95	251.77	253.04
2	18.51	19	19.16	19.25	19.3	19.35	19.4	19.43	19.48	19.49
3	10.13	9.55	9.28	9.12	9.01	8.89	8.79	8.7	8.58	8.55
4	7.71	6.94	6.59	6.39	6.26	6.09	5.96	5.86	5.7	5.66
5	6.61	5.79	5.41	5.19	5.05	4.88	4.74	4.62	4.44	4.41
6	5.99	5.14	4.76	4.53	4.39	4.21	4.06	3.94	3.75	3.71
7	5.59	4.74	4.35	4.12	3.97	3.79	3.64	3.51	3.32	3.27
8	5.32	4.46	4.07	3.84	3.69	3.5	3.35	3.22	3.02	2.97
9	5.12	4.26	3.86	3.63	3.48	3.29	3.14	3.01	2.8	2.76
10	4.96	4.1	3.71	3.48	3.33	3.14	2.98	2.85	2.64	2.59
11	4.84	3.98	3.59	3.36	3.2	3.01	2.85	2.72	2.51	2.46
12	4.75	3.89	3.49	3.26	3.11	2.91	2.75	2.62	2.4	2.35
13	4.67	3.81	3.41	3.18	3.03	2.83	2.67	2.53	2.31	2.26
14	4.6	3.74	3.34	3.11	2.96	2.76	2.6	2.46	2.24	2.19
15	4.54	3.68	3.29	3.06	2.9	2.71	2.54	2.4	2.18	2.12
16	4.49	3.63	3.24	3.01	2.85	2.66	2.49	2.35	2.12	2.07
17	4.45	3.59	3.2	2.96	2.81	2.61	2.45	2.31	2.08	2.02
18	4.41	3.55	3.16	2.93	2.77	2.58	2.41	2.27	2.04	1.98
19	4.38	3.52	3.13	2.9	2.74	2.54	2.38	2.23	2	1.94
20	4.35	3.49	3.1	2.87	2.71	2.51	2.35	2.2	1.97	1.91
21	4.32	3.47	3.07	2.84	2.68	2.49	2.32	2.18	1.94	1.88
22	4.3	3.44	3.05	2.82	2.66	2.46	2.3	2.15	1.91	1.85
23	4.28	3.42	3.03	2.8	2.64	2.44	2.27	2.13	1.88	1.82
24	4.26	3.4	3.01	2.78	2.62	2.42	2.25	2.11	1.86	1.8
25	4.24	3.39	2.99	2.76	2.6	2.4	2.24	2.09	1.84	1.78
26	4.23	3.37	2.98	2.74	2.59	2.39	2.22	2.07	1.82	1.76
27	4.21	3.35	2.96	2.73	2.57	2.37	2.2	2.06	1.81	1.74
28	4.2	3.34	2.95	2.71	2.56	2.36	2.19	2.04	1.79	1.73
29	4.18	3.33	2.93	2.7	2.55	2.35	2.18	2.03	1.77	1.71
30	4.17	3.32	2.92	2.69	2.53	2.33	2.16	2.01	1.76	1.7
40	4.08	3.23	2.84	2.61	2.45	2.25	2.08	1.92	1.66	1.59
60	4	3.15	2.76	2.53	2.37	2.17	1.99	1.84	1.56	1.48
100	3.94	3.09	2.7	2.46	2.31	2.1	1.93	1.77	1.48	1.39
1000	3.85	3	2.61	2.38	2.22	2.02	1.84	1.68	1.36	1.26

<p>Chapter 1: no key formulas. Chapter 2: Relative Frequency=freq. of the class / n. Approx. Class Width: =(largest value-smallest value) / number of classes. Chapter 3: sample and population means</p> $\bar{x} = \sum x_i/n \text{ and } \mu = \sum x_i/N$ <p>Weighted mean and geometric mean</p> $\bar{x} = \sum w_i x_i / w_i \text{ and } \bar{x}_g = [(x_1)(x_2) \dots (x_n)]^{1/n}.$ <p>Interquartile Range: IQR = $Q_3 - Q_1$. Population and sample variance</p> $\sigma^2 = \frac{\sum (x_i - \mu)^2}{N} \text{ and } s^2 = \frac{\sum (x_i - \bar{x})^2}{n - 1}$ <p>Population and sample standard deviation</p> $\sigma = \sqrt{\sigma^2} \text{ and } s = \sqrt{s^2}.$ <p>Coefficient of Variation</p> $\left(\frac{\text{Standard deviation}}{\text{Mean}} \times 100 \right) \%$ <p>z-Score: $z_i = \frac{x_i - \bar{x}}{s}$. Population and Sample Covariance</p> $\sigma_{xy} = \frac{\sum (x_i - \mu_x)(y_i - \mu_y)}{N} \text{ and } s_{xy} = \frac{\sum (x_i - \bar{x})(y_i - \bar{y})}{n - 1}$ <p>Population and Sample Pearson Correlation</p> $\rho_{xy} = \sigma_{xy} / (\sigma_x \sigma_y) \text{ and } r_{xy} = s_{xy} / (s_x s_y).$ <p>Chapter 4: Counting Rule for Combinations</p> $C_n^N = \binom{N}{n} = \frac{N!}{n!(N-n)!}.$ <p>Counting Rule for Permutations</p> $P_n^N = n! \binom{N}{n} = \frac{N!}{(N-n)!}.$ <p>Probability Rules: $P(A) = 1 - P(A^c)$</p>	<p>Chapter 4 continued:</p> $P(A \cup B) = P(A) + P(B) - P(A \cap B)$ $P(A B) = \frac{P(A \cap B)}{P(B)}$ $P(A \cap B) = P(B)P(A B) = P(A)P(B A).$ <p>Multiplication Law for Independent Events</p> $P(A \cap B) = P(B)P(A).$ <p>Bayes' Theorem</p> $P(A_i B) = \frac{P(A_i)P(B A_i)}{P(A_1)P(B A_1) + P(A_2)P(B A_2) + \dots + P(A_n)P(B A_n)}$ <p>Chapter 5: Discrete Uniform Probability Mass Function: $f(x) = 1/n$. Expected Value of a Discrete R. V.: $E(x) = \mu = \sum x f(x)$. Variance of a Discrete R. V.:</p> $Var(x) = \sigma^2 = \sum (x - \mu)^2 f(x).$ <p>Number of Experimental Outcomes Providing Exactly x Successes in n Trials</p> $\binom{n}{x} = \frac{n!}{x!(n-x)!}.$ <p>Binomial Probability Mass Function</p> $P(X = x) = f(x) = \binom{n}{x} p^x (1-p)^{(n-x)}.$ <p>Expected Value for Binomial Distribution: $E(x) = \mu = np$. Variance for Binomial Distr.: $Var(x) = \sigma^2 = np(1-p)$. Poisson Probability Mass Function:</p> $P(X = x \mu) = f(x) = \frac{\mu^x e^{-\mu}}{x!}.$ <p>Hypergeometric Probability Mass Function and Expected Value:</p> $f(x) = \frac{\binom{r}{x} \binom{N-r}{n-x}}{\binom{N}{n}} \text{ and } E(x) = \mu = \frac{nr}{N}.$	<p>Chapter 5 continued: Variance for the Hypergeometric Distribution:</p> $Var(x) = \sigma^2 = n \left(\frac{r}{N} \right) \left(1 - \frac{r}{N} \right) \left(\frac{N-n}{N-1} \right).$ <p>Chapter 6: Uniform PDF</p> $f(x) = \begin{cases} \frac{1}{b-a} & \text{if } a \leq x \leq b \\ 0 & \text{otherwise} \end{cases}$ <p>Normal PDF The density function is</p> $f(x) = \frac{1}{\sqrt{2\pi\sigma^2}} \exp\left(-\frac{(x-\mu)^2}{2\sigma^2}\right).$ <p>Converting to the Standard Normal rv:</p> $z = \frac{x - \mu}{\sigma}.$ <p>Exponential PDF and CDF for $x \geq 0$</p> $f(x) = \mu^{-1} e^{-x/\mu} \text{ and } P(x \leq x_0) = 1 - e^{-x_0/\mu}.$ <p>Chapter 7: expected value of \bar{x}</p> $E(\bar{x}) = \mu.$ <p>Standard Deviation of \bar{x} (Standard Error)</p> $\sigma_{\bar{x}} = \frac{\sigma}{\sqrt{n}}.$ <p>Expected Value and Std Dev (Standard Error) of \bar{p}</p> $E(\bar{p}) = p \text{ and } \sigma_{\bar{p}} = \sqrt{\frac{p(1-p)}{n}}$ <p>Finite Pop. Correction Factor: $\sqrt{(N-n)/(N-1)}$. Chapter 8: Interval Estimate of Population Mean, σ known and unknown</p> $\bar{x} \pm z_{\alpha/2} \frac{\sigma}{\sqrt{n}} \text{ and } \bar{x} \pm t_{\alpha/2} \frac{s}{\sqrt{n}}$ <p>Necessary Sample Size for Interval Estimate of μ</p> $n = \frac{(z_{\alpha/2})^2 \sigma^2}{E^2}$
---	--	---

<p>Chapter 8 continued: Interval Estimate of p</p> $\hat{p} \pm z_{\alpha/2} \frac{p(1-p)}{\sqrt{n}}$ <p>Necessary Sample Size for Interval Estimate of p</p> $n = \frac{(z_{\alpha/2})^2 p^*(1-p^*)}{E^2}$ <p>Chapter 9: Test Statistic for Hypothesis Tests About μ, σ known and unknown</p> $z = \frac{\bar{x} - \mu_0}{\sigma/\sqrt{n}} \text{ and } t = \frac{\bar{x} - \mu_0}{s/\sqrt{n}}$ <p>Test Stat for Hypothesis About p</p> $z = \frac{\hat{p} - p_0}{\sqrt{\frac{p_0(1-p_0)}{n}}}$ <p>Chapter 10: Point Estimate and Standard Error for Difference in Two Population Means</p> $\bar{x}_1 - \bar{x}_2 \text{ and } \sigma_{\bar{x}_1 - \bar{x}_2} = \sqrt{\frac{\sigma_1^2}{n_1} + \frac{\sigma_2^2}{n_2}}$ <p>Interval Estimate and Test Statistic for Difference in Two Means with Known Variances</p> $\bar{x}_1 - \bar{x}_2 \pm z_{\alpha/2} \sqrt{\frac{\sigma_1^2}{n_1} + \frac{\sigma_2^2}{n_2}} \text{ and } z = \frac{\bar{x}_1 - \bar{x}_2 - D_0}{\sqrt{\frac{\sigma_1^2}{n_1} + \frac{\sigma_2^2}{n_2}}}$ <p>Interval Estimate and Test Statistic for Difference in Two Means with Unknown Variances</p> $\bar{x}_1 - \bar{x}_2 \pm t_{\alpha/2} \sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}} \text{ and } t = \frac{\bar{x}_1 - \bar{x}_2 - D_0}{\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}}$ <p>Degrees of Freedom for t, Two Independent Random Samples</p> $df = \frac{1}{\frac{1}{n_1-1} \left(\frac{s_1^2}{n_1}\right)^2 + \frac{1}{n_2-1} \left(\frac{s_2^2}{n_2}\right)^2} \left(\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}\right)$	<p>Chapter 10 continued: Test Statistic (Matched Samples)</p> $t = \frac{\bar{d} - \mu_d}{s_d/\sqrt{n}}$ <p>ANOVA Related:</p> $\bar{x}_j = \frac{\sum_{i=1}^{n_j} x_{ij}}{n_j} \quad s_j^2 = \frac{\sum_{i=1}^{n_j} (x_{ij} - \bar{x}_j)^2}{n_j - 1} \quad \bar{\bar{x}} = \frac{\sum_{j=1}^k \sum_{i=1}^{n_j} x_{ij}}{n_T}$ $MSTR = \frac{SSTR}{k-1} \quad SSTR = \sum_{j=1}^k n_j (\bar{x}_j - \bar{\bar{x}})^2 \quad MSE = \frac{SSE}{n_T - k}$ $SSE = \sum_{j=1}^k \sum_{i=1}^{n_j} (x_{ij} - \bar{x}_j)^2 \quad F = MSTR/MSE$ $SST = \sum_{j=1}^k \sum_{i=1}^{n_j} (x_{ij} - \bar{\bar{x}})^2 \quad SST = SSTR + SSE$ <p>Chapter 11: not covered in this course Chapter 12: $y = \beta_0 + \beta_1 x + \epsilon$</p> $E(y) = \beta_0 + \beta_1 x \quad \hat{y} = b_0 + b_1 x \quad b_0 = \bar{y} - b_1 \bar{x}$ $b_1 = \frac{\sum (x_i - \bar{x})(y_i - \bar{y})}{\sum (x_i - \bar{x})^2} \quad SSE = \sum (y_i - \hat{y}_i)^2$ $SST = \sum (y_i - \bar{y})^2 \quad SSR = \sum (\hat{y}_i - \bar{y})^2 \quad SST = SSR + SSE$ $r^2 = \frac{SSR}{SST} \quad r_{xy} = (\text{sign of } b_1) \sqrt{r^2} \quad s^2 = MSE = \frac{SSE}{n-2}$ <p>Standard Error of the Estimate, $s = \sqrt{MSE}$.</p> $\sigma_{b_1} = \frac{\sigma}{\sqrt{\sum (x_i - \bar{x})^2}} \quad s_{b_1} = \frac{s}{\sqrt{\sum (x_i - \bar{x})^2}} \quad t = \frac{b_1}{s_{b_1}}$ <p>For simple regression, $MSR = SSR$ because there is only one independent variable.</p> $F = \frac{MSR}{MSE} \quad s_{\hat{y}^*} = s \sqrt{\frac{1}{n} + \frac{(x^* - \bar{x})^2}{\sum (x_i - \bar{x})^2}}$ <p>Confidence Interval for $E(y^*)$: $\hat{y}^* \pm t_{\alpha/2} s_{\hat{y}^*}$</p> $s_{\text{pred}} = s \sqrt{1 + \frac{1}{n} + \frac{(x^* - \bar{x})^2}{\sum (x_i - \bar{x})^2}}$	<p>Chapter 12 continued: Prediction Interval for y^*:</p> $\hat{y}^* \pm t_{\alpha/2} s_{\text{pred}}$ <p>Residual for Observation i: $y_i - \hat{y}_i$ Chapter 13:</p> $y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \dots + \beta_p x_p + \epsilon$ $E(y) = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \dots + \beta_p x_p$ $\hat{y} = b_0 + b_1 x_1 + b_2 x_2 + \dots + b_p x_p$ $SST = SSR + SSE \quad R^2 = \frac{SSR}{SST}$ $R_a^2 = 1 - (1 - R^2) \frac{n-1}{n-p-1}$ $MSR = \frac{SSR}{p} \quad MSE = \frac{SSE}{n-p-1} \quad F = \frac{MSR}{MSE}$ $t = \frac{b_i}{s_{b_i}}$ <p>Other Math Rule Reminders:</p> $e^x = \exp(x)$ $\ln 1 = 0 \quad \ln e = 1$ $x! = (x)(x-1)(x-2) \dots (2)(1)$ $0! = 1 \quad x^0 = 1$
--	---	---

VERSION B

Choose the best answer. Do not write letters in the margin or communicate with other students in any way. If you have a question note it on your exam and ask for clarification when your exam is returned. In the meantime choose the best answer. Neither the proctors nor Dr. Cox will answer questions during the exam.

Please check each question and possible answers thoroughly as questions at the bottom of a page sometimes run onto the next page. Please verify that your test version and scantron version are the same.

This exam has 25 questions.

1. I have checked that my ID is bubbled in correctly. If it is bubbled in incorrectly I will get this question wrong. I also understand that questions and their possible answers may run onto the next page and so I should always check the top of the next page for possible answers. I understand that if I have a question I should simply make a note on my exam and ask Dr. Cox afterwards. I should always choose the best answer.
 - (a) False.
 - (b) I didn't read the directions.
 - (c) True.

2. What is the critical t value when there are 39 degrees of freedom and the confidence coefficient is 0.8?
 - (a) 1.5236386
 - (b) 1.3036386
 - (c) 1.1732747
 - (d) 1.0429109

3. Suppose that the time between sales of Beyonce's Lemonade are right skew. That is, after a sale the next sale typically happens in a short amount of time but there are cases where it takes a long time between sales (usually at night time). Suppose that the average time between sales is 1 second; the first day this album sold almost 140 copies per minute. What is the probability of 6 seconds or more elapsing between one sale and the next?
 - (a) -0.0299939
 - (b) 0.0030241
 - (c) 0.0012394
 - (d) 0.0024788

4. For the exponential distribution $P(X < \mu) < P(X > \mu)$; note $X \in [0, \infty]$.
 - (a) true
 - (b) false
 - (c) this is true for some values of μ but not for all values of μ .

5. Suppose that the average number of students visiting the bank in the MU during the noon hour is 45. What is the probability that exactly 43 students will visit the bank in one particular noon hour? Assume that the number of students visiting the bank follows the Poisson distribution.

- (a) 0.0325033
- (b) 0.104475
- (c) 0.0580416
- (d) 0.1110416

6. Refer to the data set here. The unemployment rate is the April 2016 seasonally adjusted value with the estimates being retrieved from the BLS on 6.2.2016. What is the coefficient of variation for the minimum wage?

State level data, April 2016		
State	minimum wage in \$	unemployment rate
California	10	5.3
Arizona	8.05	5.5
Nevada	8.25	5.8
Utah	7.25	3.7
New Mexico	7.5	6.2

- (a) 9.199792%
- (b) 15.7710719%
- (c) 13.1425599%
- (d) 17.0853279%
- (e) 14.0625391%

7. Refer to the data set here. The unemployment rate is the April 2016 seasonally adjusted value with the estimates being retrieved from the BLS on 6.2.2016. What is the z value for New Mexico for the minimum wage?

State level data, April 2016		
State	minimum wage in \$	unemployment rate
California	10	5.3
Arizona	8.05	5.5
Nevada	8.25	5.8
Utah	7.25	3.7
New Mexico	7.5	6.2

- (a) -0.6580141
- (b) -0.2280141
- (c) -0.6185333

- (d) -0.4737702
- (e) -0.4027047

8. Refer to the data set here. The unemployment rate is the April 2016 seasonally adjusted value with the estimates being retrieved from the BLS on 6.2.2016. What is the probability of observing a z value less than for New Mexico's minimum wage z value?

State level data, April 2016		
State	minimum wage in \$	unemployment rate
California	10	5.3
Arizona	8.05	5.5
Nevada	8.25	5.8
Utah	7.25	3.7
New Mexico	7.5	6.2

- (a) 0.2681119
 - (b) 0.3178319
 - (c) 0.3435828
 - (d) 0.2552645
 - (e) 0.4098176
9. Which of the following types of sampling is most likely to have a seasonality or periodicity problem?
- (a) cluster
 - (b) stratified
 - (c) systematic
 - (d) convenience
10. Suppose you are conducting a political poll. You find a city in the U.S. that has a demographic make up that is similar to the demographic make up of the U.S. as a whole. You then randomly poll people within that city. This is an example of which type of sampling?
- (a) cluster
 - (b) stratified
 - (c) systematic

- (d) random
11. Suppose that Steph Curry takes 37 warm up shots before the game and makes them at a rate of 0.5. What is the probability he will make exactly 21 shots?
- (a) 0.0936836
 - (b) 0.0444349
 - (c) 0.1285853
 - (d) 0.0655785
12. Suppose that Steph Curry takes 37 warm up shots before the game and makes them at a rate of 0.5. What is the expected number of shots he will make?
- (a) 18.5
 - (b) 17.2
 - (c) 20.6
 - (d) 19.7
13. The uniform distribution is symmetric.
- (a) True.
 - (b) False.
 - (c) True whenever the minimum value is positive; otherwise the statement is not true.
14. Suppose you have a random variable that is uniformly distributed with a maximum of 258 and a minimum of 75. What is the expected value of this random variable?
- (a) 166.5
 - (b) 186.5
 - (c) 151.5
 - (d) 216.45
15. Suppose that the known standard deviation for the numbers of hours that students work in a week is 13.6. If I draw a sample of 21 what is the standard error?
- (a) 3.8580923
 - (b) 2.9677633
 - (c) 2.3742106

- (d) 0.647619
16. Suppose that in a recent sample of 25 recent graduates with business degrees the mean starting salary is 54706 and the standard deviation is 1968. Construct a 99% confidence interval for the mean starting salary for business majors.
- (a) [54005, 55406]
(b) [53005, 56406]
(c) [53605, 55806]
(d) [48244, 50225]
17. You are given the following, $s = 11.6$, $\bar{x} = 65$ and $n = 21$. Construct a 90% confidence interval. The resulting interval is
- (a) [60.6341732, 69.3658268]
(b) [58.6341732, 73.3658268]
(c) [54.6341732, 75.3658268]
(d) [54.5707559, 72.8341181]
18. Suppose that you have a sample with 16 observations. You are going to use this sample to construct a confidence interval for the population mean. How many degrees of freedom are there?
- (a) 8
(b) 15
(c) 4
(d) 16
19. What is the probability of observing a z value less than 0.213?
- (a) 0.5843
(b) 0.5143
(c) 0.4157
(d) 0.7043
20. For a confidence coefficient of 0.84 we will have an α of.
- (a) 0.16
(b) 0.08

- (c) 0.42
- (d) 0.84

21. Refer to the data set here. The unemployment rate is the April 2016 seasonally adjusted value with the estimates being retrieved from the BLS on 6.2.2016. What is the average unemployment rate?

State level data, April 2016		
State	minimum wage in \$	unemployment rate
California	10	5.3
Arizona	8.05	5.5
Nevada	8.25	5.8
Utah	7.25	3.7
New Mexico	7.5	6.2

- (a) 5.3
- (b) 5.73
- (c) 0.636
- (d) 5.1516
- (e) 5.5756

22. Refer to the data set here. The unemployment rate is the April 2016 seasonally adjusted value with the estimates being retrieved from the BLS on 6.2.2016. What is the standard deviation for the unemployment rate?

State level data, April 2016		
State	minimum wage in \$	unemployment rate
California	10	5.3
Arizona	8.05	5.5
Nevada	8.25	5.8
Utah	7.25	3.7
New Mexico	7.5	6.2

- (a) 0.6887206
- (b) 0.5854125
- (c) 0.9565563
- (d) 1.3865563
- (e) 0.8991629

23. Refer to the data set here. The unemployment rate is the April 2016 seasonally adjusted value with the estimates being retrieved from the BLS on 6.2.2016. What is the z value for Nevada's unemployment rate?

State level data, April 2016		
State	minimum wage in \$	unemployment rate
California	10	5.3
Arizona	8.05	5.5
Nevada	8.25	5.8
Utah	7.25	3.7
New Mexico	7.5	6.2

- (a) 0.38105
(b) 0.2676267
(c) 0.8427084
(d) 0.5227084
(e) 2.6830621
24. The unemployment rates in the tables above are time series data.
- (a) True.
(b) False.
25. $E(X) = \mu = E(\bar{x})$.
- (a) True.
(b) False.

Key

1. c
2. b, refer to the t table
3. d, calculate $e^{-6/1}$
4. b, false, note $e^{-\mu/\mu} = e^{-1} = 0.3678794$
5. c, plug in to the Poisson PMF which is on the formula sheet
6. c, use $s/\bar{x} \times 100\%$
7. a
8. d, refer to the z table
9. c, refer to the lecture notes
10. a, refer to the lecture notes
11. a, use the formula for the binomial PMF
12. a, amazing as he is I don't expect him to make every shot
13. a,
14. a, $(\min + \max)/2$
15. b, the standard error is σ/\sqrt{n}
16. c, construct the interval as $\bar{x} \pm$ margin of error.
17. a
18. b
19. a, refer to the z table
20. a,
21. a,
22. c
23. d
24. b, false
25. a, true.