Start homework 2

section 6.1

ex 5

a. Discrete

b) continuous

c) discrete

d) continuous

e) discrete

ex 7 a) discrete

b) continuous

c) continuous

d) discrete

e) continuous

section 6.2

ex 7 No it is not as the sum of the probabilities are > 1

ex 9 No because one of the probabilities is negative.

Section 6.3

prob 7

6.2-14

$$\sum x \cdot p(x) = \mu$$

$$\mu = 400 \cdot 0 + 420 \cdot 0.1 + 440 \cdot 0.2$$

$$(420 \cdot 0.1) + (440 \cdot 0.1) + (460 \cdot 0.2) + (480 \cdot 0.2) + (500 \cdot 0.4) = 474$$

$$\mu = 474$$

$$\sigma^2 = \sum (x - \mu)^2 \cdot p(x)$$

$$(420 - 474)^2 \cdot 0.1 = 291.6$$

$$(440 - 474)^2 \cdot 0.1 = 115.6$$

$$(460 - 474)^2 \cdot 0.2 = 39.2$$

$$(480 - 474)^2 \cdot 0.2 = 7.2$$

$$(500 - 474)^2 \cdot 0.4 = 270.4$$

$$291.6 + 115.6 + 39.2 + 7.2 + 270.4 = 724$$

6.3 EX (6.2-23)

a)

X	P(X)
50000	0.4
-10000	0.6

b) $E(X) = 50{,}000 \cdot 0.4 - 10{,}000 \cdot 0.6$

$E(X) = 14{,}000$

c) $\sigma^2 = (50{,}000 - 14{,}000)^2 + (-10{,}000 - 14{,}000)^2$

$\sigma^2 = 864{,}000{,}000 \rightarrow$ variance

$\sigma = \sqrt{864{,}000{,}000} = 29{,}393.877$

6.2 - 23 (6.3 prob 9)

a)

x	1	2	3	4	5
$P(x)$	0.1	0.2	0.3	0.2	0.2

$$\mu = 1(0.1) + 2(0.2) + 3(0.3) + 4(0.2) + 5(0.2)$$
$$= 3.2$$

b) $\sigma^2 = (1-3.2)^2 \cdot 0.1 + (2-3.2)^2 \cdot 0.2 + (3-3.2)^2 \cdot 0.3 + (4-3.2)^2 \cdot 0.2 + (5-3.2)^2 \cdot 0.2 =$

$$= 1.56$$

c) $\sqrt{1.56} = 1.249$

d) 0.2

e) $0.2 + 0.3 + 0.2 + 0.2 = 0.9$

f) $0.1 + 0.2 + 0.3 = 0.6$

g) 0.1

0.2 Prob 25?

6.4 prob 9

a) $E(x) = n \cdot p = 9 \cdot 0.1 = 0.9$

b) $\sigma = \sqrt{np(1-p)}$

$$\frac{(9 \cdot 0.1)(1-.1)}{\sqrt{0.9 \cdot 0.9}} = 0.9$$

c) $P(X=2)$

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

$$\frac{9!}{2!(9-2)!} \cdot 0.1^2 \cdot (1-2)^{9-2} = 0.172$$

6.4 prob 13 (6.5 prob 13)

a) $p = .1 \quad n = 7 \quad q = 1 - p = .9$

b) $P(x=0)$

$$\frac{n!}{x!(n-x)!} \cdot p^x \cdot q^{n-x}$$

$$\frac{7!}{0!(7)!} \cdot 0.1^0 \cdot 0.9^7 = 0.478$$

$P(x=4)$

$$\frac{7!}{4!(7-4)!} \cdot 0.1^4 \cdot 0.9^{(7-4)} = 0.00255$$

$P(x=7)$

$$\frac{7!}{7!(7-7)!} \cdot 0.1^7 \cdot 0.9^0 = .0000001$$

c) $E(x) = 7 \cdot 0.1 = 0.7$

d) $\sigma^2 = npq = 0.7(0.9) = 0.63$

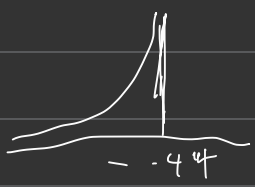
$\sigma = \sqrt{0.63} = 0.794$

Htw 2 Set 4

7.4 prob 9 (7.3 prob 9) a, b, c

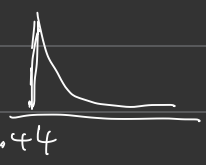
−0.5	0.2776	0.2810	0.2843	0.2877	0.2912	0.2946	0.2981	0.3015	0.3050	0.3085
−0.4	0.3121	0.3156	0.3192	0.3228	0.3264	0.3300	0.3336	0.3372	0.3409	0.3446
−0.3	0.3483	0.3520	0.3557	0.3594	0.3632	0.3669	0.3707	0.3745	0.3783	0.3821
−0.2	0.3859	0.3897	0.3936	0.3974	0.4013	0.4052	0.4090	0.4129	0.4168	0.4207

a) 0.3300



$$z = \frac{x - \mu}{\sigma}$$

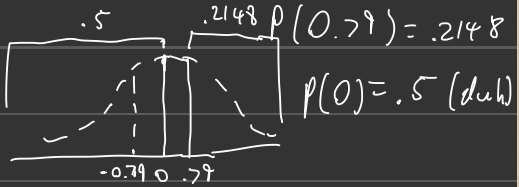
b) .3300



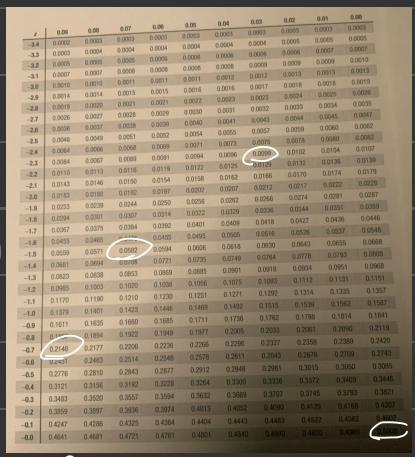
c) $1 - 2(.33) = .34$

7.3 Ex 11 a, b

a) $P(0 \le z \le 0.79)$



$1 - (.5 + .2148) = .285$

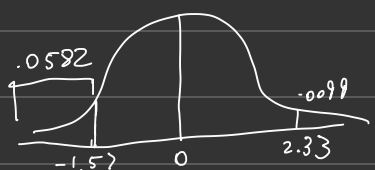


z	0.09	0.08	0.07	0.06	0.05	0.04	0.03	0.02	0.01	0.00
-3.4	0.0002	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003
-3.3	0.0003	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0005	0.0005	0.0005
-3.2	0.0005	0.0005	0.0005	0.0006	0.0006	0.0006	0.0006	0.0006	0.0007	0.0007
-3.1	0.0007	0.0007	0.0008	0.0008	0.0008	0.0008	0.0009	0.0009	0.0009	0.0010
-3.0	0.0010	0.0010	0.0011	0.0011	0.0011	0.0012	0.0012	0.0013	0.0013	0.0013
-2.9	0.0014	0.0014	0.0015	0.0015	0.0016	0.0016	0.0017	0.0018	0.0018	0.0019
-2.8	0.0019	0.0020	0.0021	0.0021	0.0022	0.0023	0.0023	0.0024	0.0025	0.0026
-2.7	0.0026	0.0027	0.0028	0.0029	0.0030	0.0031	0.0032	0.0033	0.0034	0.0035
-2.6	0.0036	0.0037	0.0038	0.0039	0.0040	0.0041	0.0043	0.0044	0.0045	0.0047
-2.5	0.0048	0.0049	0.0051	0.0052	0.0054	0.0055	0.0057	0.0059	0.0060	0.0062
-2.4	0.0064	0.0066	0.0068	0.0069	0.0071	0.0073	0.0075	0.0078	0.0080	0.0082
-2.3	0.0084	0.0087	0.0089	0.0091	0.0094	0.0096	0.0099	0.0102	0.0104	0.0107
-2.2	0.0110	0.0113	0.0116	0.0119	0.0122	0.0125	0.0129	0.0132	0.0136	0.0139
-2.1	0.0143	0.0146	0.0150	0.0154	0.0158	0.0162	0.0166	0.0170	0.0174	0.0179
-2.0	0.0183	0.0188	0.0192	0.0197	0.0202	0.0207	0.0212	0.0217	0.0222	0.0228
-1.9	0.0233	0.0239	0.0244	0.0250	0.0256	0.0262	0.0268	0.0274	0.0281	0.0287
-1.8	0.0294	0.0301	0.0307	0.0314	0.0322	0.0329	0.0336	0.0344	0.0351	0.0359
-1.7	0.0367	0.0375	0.0384	0.0392	0.0401	0.0409	0.0418	0.0427	0.0436	0.0446
-1.6	0.0455	0.0465	0.0475	0.0485	0.0495	0.0505	0.0516	0.0526	0.0537	0.0548
-1.5	0.0559	0.0571	0.0582	0.0594	0.0606	0.0618	0.0630	0.0643	0.0655	0.0668
-1.4	0.0681	0.0694	0.0708	0.0721	0.0735	0.0749	0.0764	0.0778	0.0793	0.0808
-1.3	0.0823	0.0838	0.0853	0.0869	0.0885	0.0901	0.0918	0.0934	0.0951	0.0968
-1.2	0.0985	0.1003	0.1020	0.1038	0.1056	0.1075	0.1093	0.1112	0.1131	0.1151
-1.1	0.1170	0.1190	0.1210	0.1230	0.1251	0.1271	0.1292	0.1314	0.1335	0.1357
-1.0	0.1379	0.1401	0.1423	0.1446	0.1469	0.1492	0.1515	0.1539	0.1562	0.1587
-0.9	0.1611	0.1635	0.1660	0.1685	0.1711	0.1736	0.1762	0.1788	0.1814	0.1841
-0.8	0.1867	0.1894	0.1922	0.1949	0.1977	0.2005	0.2033	0.2061	0.2090	0.2119
-0.7	0.2148	0.2177	0.2206	0.2236	0.2266	0.2296	0.2327	0.2358	0.2389	0.2420
-0.6	0.2451	0.2483	0.2514	0.2546	0.2578	0.2611	0.2643	0.2676	0.2709	0.2743
-0.5	0.2776	0.2810	0.2843	0.2877	0.2912	0.2946	0.2981	0.3015	0.3050	0.3085
-0.4	0.3121	0.3156	0.3192	0.3228	0.3264	0.3300	0.3336	0.3372	0.3409	0.3446
-0.3	0.3483	0.3520	0.3557	0.3594	0.3632	0.3669	0.3707	0.3745	0.3783	0.3821
-0.2	0.3859	0.3897	0.3936	0.3974	0.4013	0.4052	0.4090	0.4129	0.4168	0.4207
-0.1	0.4247	0.4286	0.4325	0.4364	0.4404	0.4443	0.4483	0.4522	0.4562	0.4602
-0.0	0.4641	0.4681	0.4721	0.4761	0.4801	0.4840	0.4880	0.4920	0.4960	0.5000

b) $P(-1.57 \le z \le 2.33)$

$P(-1.57) = 0.0582$

$P(2.33) = 0.0099$

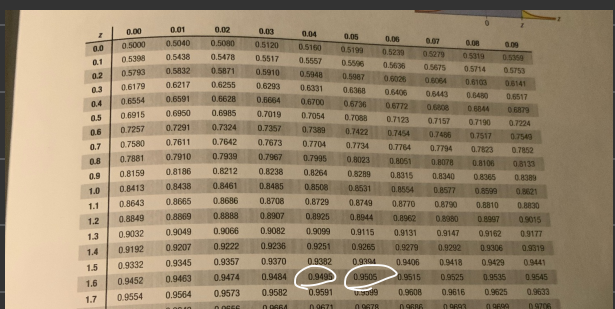


$1 - (.0582 + .0099) = 0.932$

7.3 - 13

$P(z) = 1 - .05 = .9500$

$z = 1.645$



z	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.0	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	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
			0.9656	0.9664	0.9671	0.9678	0.9686	0.9693	0.9699	0.9706

7.3 – 25

$\sigma = 1.5$ $\quad x < 8 \mid x > 10.5$

$\mu = 9$ $\quad E(X) = n\left(\frac{A}{N}\right)$

$\sigma^2 = 2.25$ $\quad N = 1$

$z = \frac{8-9}{1.5}$

$z = -.667$ $\quad P(x < 8) =$

$\frac{10.5-9}{1.5} = 1.00$ $\quad P(x > 10.5) =$

$P(z < -.67) = .2514$

$P(z > 1) = 1 - .8413 = .159$

$P(x < 8)$ or $P(x > 10.5) = .41$

8.2 prob 11 (8.3 prob 11)

a) $n = 40$ $\mu = 50$ $\sigma = 10$

$\sigma_{\bar{x}} = \frac{\sigma}{\sqrt{n}}$ $\sigma_{\bar{x}} = \frac{10}{\sqrt{40}} = 1.581 = \sigma_{\bar{x}}$

b) $n = 100$

$\sigma_{\bar{x}} = \frac{10}{\sqrt{100}} = 1$

8.3 prob 15

$\mu = 100 \quad \sigma = 10$

$n = 36 \rightarrow$ CLT applies

$\sigma_{\bar{x}} = \frac{\sigma}{\sqrt{n}} \quad \frac{10}{\sqrt{50}} =$

$\sigma_{\bar{x}} = 1.414$

a) $P(\bar{x} \leq 110) \qquad z = \frac{\bar{x} - \mu_{\bar{x}}}{1}$

$z = \frac{\bar{x} - 100}{1.414} \qquad \frac{110 - 100}{1.414} = 7.071$

$P(z \leq 7.071) \approx 1$

b) $P(x \geq 90) \qquad \sigma_{\bar{x}} = 1.414$

$\frac{90 - 100}{1.414} = -7.071$

$(P \geq -7.071) \approx 1$

8.2 prob 17

$\mu = 110 \qquad \sigma = 20$

a) $P(x < 99)$

$$z = \frac{99 - 110}{20}$$

$$z = -.55$$

$$P(z < -.55) = .2912$$

b) $P(x < 99)$

$$\sigma_{\bar{x}} = \frac{20}{\sqrt{35}} = 3.381$$

$$z = \frac{99 - 110}{3.381} = -3.253$$

$P(z < -3.253) = .0006$

8.2 problem 21

$\mu = 102 \quad \sigma = 40 \quad n = 50$

a) $p(x \geq 105) \qquad \sigma_{\bar{x}} = \frac{40}{\sqrt{50}} = 5.657$

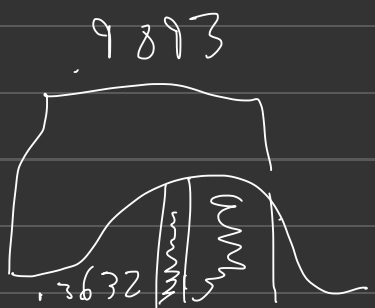
$z = \frac{105 - 102}{5.657} = .53 \rightarrow$

$p(z \geq .053) = .2981$

b) $p(x \leq 90)$

$\frac{90 - 102}{5.657} = -2.121$

$p(z \leq -2.121) = 0.170$



c) $p(100 \leq x \leq 115)$

$z = \frac{100 - 102}{5.657} = -.354$

$z = \frac{115 - 102}{5.657} = 2.298$

$p(z \geq -.354) = 1 - .3632$

$= .637$

$p(z \leq 2.298) = 1 - .9893$

$.0107$

$.626 = .637 - .0107$