

## Homework 4

$$1. \mu = 70 \quad \frac{\sigma}{\sqrt{n}} = \frac{2.8}{\sqrt{25}} = \frac{2.8}{5} = \boxed{0.56}$$

$$x=69 \quad \frac{69-70}{0.56} = \frac{-1}{0.56} = -1.79 \approx 0.0367$$

$$x=71 \quad \frac{71-70}{0.56} = \frac{1}{0.56} = 1.79 \approx 0.9633$$

$$0.9633 - 0.0367 = 0.9266 = \boxed{92.66\%}$$

$$2. \mu = 1509 \quad \sigma = 339 \quad n = 100$$

$$\frac{\sigma}{\sqrt{n}} = \frac{339}{\sqrt{100}} = \frac{339}{10} = 33.9$$

$$z_1 = \frac{1450 - 1509}{33.9} = \frac{-59}{33.9} = -1.74 = 0.0409$$

$$z_2 = \frac{1600 - 1509}{33.9} = \frac{91}{33.9} = 2.68 = 0.9963$$

$$0.9963 - 0.0409 = 0.9554 = 95.54\%$$

$$3. \mu = 18 \quad \sigma = 4.2 \quad \frac{\sigma}{\sqrt{n}} = \frac{4.2}{\sqrt{18}} = 0.7$$

$$x = 17 \quad z_1 = \frac{17 - 18}{0.7} = \frac{-1}{0.7} = -1.43 = 0.9236$$

$$x = 19 \quad z_2 = \frac{19 - 18}{0.7} = \frac{1}{0.7} = 1.43 = 0.0764$$

$$0.9236 - 0.0764 = 0.8472 = 84.72\%$$

$$4. p = 0.13 \quad n = 200 \quad np = 200 \cdot 0.13 = 26 = \mu$$
$$n(1-p) = 200(1-0.13) = 200 \cdot 0.87 = 174$$

$$\sigma = \sqrt{200 \cdot 0.13 \cdot 0.87} = 4.756$$

$$20\% \times 200 = 0.20 \cdot 200 = 40$$

$$z = \frac{40.5 - 26}{4.756} = 2.9437$$

$$1 - 0.9984 = \boxed{0.0016}$$

$$5. \bar{x} = \$340 \quad \sigma = \$62 \quad n = 45 \quad n-1 = 45-1 = 44$$

$$\alpha = 1 - 0.90 = 0.10 \quad \frac{\alpha}{2} = 0.05$$

$$t = 1.68 \quad E = 1.68 \left( \frac{62}{\sqrt{45}} \right) = 1.68 \left( \frac{62}{6.708} \right) = 1.68(9.242) = 15.53$$

$$\text{lower } 340 - 15.53 = \boxed{324.47}$$

$$\text{upper } 340 + 15.53 = \boxed{355.53}$$

$$6. 11\% = 0.11 \quad n = 1012 \quad 98\% = 0.98$$

$$\alpha = 1 - 0.98 = 0.02 \quad \frac{\alpha}{2} = \frac{0.02}{2} = 0.01$$

$$\bar{z} = 1 - 0.01 = 0.99 = 2.33$$

$$\text{margin of error} = 2.33 \sqrt{\frac{0.11(1-0.11)}{1012}} = 2.33 \sqrt{\frac{0.0979}{1012}}$$

$$= 2.33 \cdot \sqrt{0.0000967} = 2.33 \cdot 0.00983$$

$$= 0.0229$$

$$\text{lower } 0.11 - 0.0229 = \boxed{0.0881}$$

$$\text{upper } 0.11 + 0.0229 = \boxed{0.1329}$$

$$7. n = \frac{(2.576)^2 \cdot (3)^2}{1} = \frac{6.635776 \cdot 9}{1} = \boxed{59.722}$$

$$8. \mu_0 = \$90 \quad \alpha = 0.10 \quad n = 14 \quad n-1 = 14-1 = 13 \quad \mu = \$85 \quad s = \$10$$

$$t = \frac{85 - 90}{\frac{10}{\sqrt{14}}} = \frac{-5}{\frac{10}{\sqrt{14}}} = \boxed{-1.8708}$$

$$0.10 - 1.8708 = \boxed{-1.7708}$$

9. Group 1 = 8

$$\frac{112 + 116 + 111 + 115 + 110 + 118 + 113 + 114}{8} = \frac{909}{8} = 113.625.$$

$$\frac{48.875}{7} = 6.982$$

Group 2 = 8

$$\frac{104 + 101 + 106 + 100 + 102 + 105 + 99 + 103}{8} = \frac{820}{8} = 102.5$$

$$\frac{40}{7} = 5.714$$

$$\frac{(8-1) \cdot 6.982 + (8-1) \cdot 5.714}{8+8-2} = \frac{90.972}{14} = \boxed{6.498}$$

$$\frac{113.625 - 102.5}{\sqrt{6.498 \left( \frac{1}{8} + \frac{1}{8} \right)}} = \frac{11.125}{1.275} = \boxed{8.725}$$

$$\alpha = 0.05, 14 = 1.761$$

10.	X	Y	XY	$X^2$	$Y^2$
	4	9	36	16	81
	7	10	70	49	100
	3	7	21	9	49
	1	3	3	1	9
sum	15	29	130	75	239

$$\bar{x} = \frac{15}{4} = 3.75 \quad \bar{y} = \frac{29}{4} = 7.25$$

$$\frac{4(130) - (15)(29)}{4(75) - (15)^2} = \frac{85}{75} = 1.1333 \quad 3 + 1.1333x$$

$$7.25 - (1.1333)(3.75) = 3$$

$$4(75) - (15)^2 = 300 - 225 = 75$$

$$4(239) - (29)^2 = 956 - 841 = 115$$

$$r = \frac{85}{\sqrt{75(115)}} = \frac{85}{\sqrt{8625}} = \frac{85}{92.87} = 0.9152$$

$$R^2 = (0.9152)^2 = 0.8376$$

$$\hat{y} = 3 + 1.1333x$$