

## ANSWERS TO EXERCISES

### Exercise 1: Descriptive Statistics

1. I, D, D, I
2. Cannot
3. parameter; statistics
4. (a) iii; (b) i; (c) ii
5. description; inference
6. census; sampling
7. a
8. a
9. a
10. e
11. (a) mode; (b) median; (c) mean
13. (a) negatively skewed; (b) positively skewed; (c) negatively skewed
14. (e) 16.78; (f) negatively skewed
15. D, C, C, D, D, C
16. 60.006, 0.036
17. (a) 51, 7, 2.94; (b) 1, 7, 2.94; (c) 61, 7, 2.94; (d) 102, 14, 5.89
18. (a) 5.1, 5, 5; (b) 49.8, 49.5, no mode
19. (a) 75%; (b) 93.75%; (c) 99%
20. 2.04%
21. skewed to the right
22. (a) 33.5; (b) 15.8; (c) 31.1; (d) 22.5, 42.4; (e) 14.9, 55.75; (f) 11.0, 64.5; (g) 0.40, 0.46; (h) 26.3
23. (a) 5.038; 0.017; (b) 99.5; (c) 0.0188
24. (a) 82.55; (b) 58.4; (c) 791.199; (d) 28.128; (e) 12.098%
25. (a) 984.08; (b) 31.37; (c) 54.46%
26. (a) A, C, D, E, F
27. 27500, 2000

### Exercise 2: Probability

1. (a) 1024; (b) 243
2. (a) 720; (b) 144; (c) 240
3. (a) 150; (b) 45; (c) 100
4. 800
5. (a)  $\frac{3}{5}$ ; (b)  $\frac{2}{5}$ ; (c)  $\frac{1}{10}$
6. (a) 0.3246; (b) 0.4496
7. 0.3437
8. (a)  $\frac{2}{5}$ ; (b)  $\frac{4}{15}$ ; (c)  $\frac{1}{3}$ ; (d)  $\frac{3}{5}$ ; (e)  $\frac{2}{3}$
9.  $\frac{63}{64}$
10.  $\frac{1}{20}$
11.  $\frac{14}{45}$
12. (a)  $\frac{1}{169}$ ; (b)  $\frac{1}{221}$
13. (a)  $\frac{8}{225}$ ; (b)  $\frac{4}{91}$

14.  $11/36$
15. (a)  $1/4$ ; (b)  $5/24$ ; (c)  $13/24$
16.  $1/4$
17. (a)  $1/8$ ; (b)  $5/72$ ; (c)  $5/36$ ; (d)  $19/27$
18.  $38/63$
19. (a) 0.58; (b) 0.69
20. 0.6255
21. (a) 0.798; (b) 0.9998; (c) 0.0786
22.  $3/10$
23. (a) 0.13; (b) 0.98; (c) 0.11

### Exercise 3: Probability Distributions

1. (a) 61.7%; (b) 54.7%
2. (a) 95.5%; (b) 23.0%; (c) 93.3%
3. (a) 1.15; (b) 0.77
4. 23%
5. (a) 5000; (b) 1359; (c) 3413; (d) 1587
6. (a) passing mark = 64; (b) highest B = 86
7. 6.238
8. (a)  $15/16$ ; (b)  $7/8$
9. 0.211
10. 0.1035
11. 0.0161
12. (a) 0.7925; (b) 0.0352; (c) 0.01012
13. (a) 0.1937; (b) 0.1839
14. 0.3134
15. 0.2657
16. (a) 0.1429; (b) 0.1353
17. 0.6288

### Exercise 4: Sampling Distribution and Estimation

1. 0.9104
2. 0.16419
3. 25
4. (a) (0.818, 0.830); (b) (0.816, 0.832)
5. (a) 97; (b) 166
6. (23.6118, 28.5882)
7. (0.28, 0.36)
8. (78.2, 2041.8)
9. (-0.0087, 1.1487)
10. (a) (0.19, 0.31); (b) (0.17, 0.33)
11. (a) 1.467; (b) 0.140; (c) 175

### Exercise 5: Test of Hypothesis

1.  $H_0: \mu=1600$ ,  $H_1: \mu \neq 1600$ ,  $z = -2.5$ ; (a) reject  $H_0$ ; (b) do not reject  $H_0$
2.  $H_0: \mu=7.5$ ,  $H_1: \mu < 7.5$ ,  $z = -1.25$ ; do not reject  $H_0$
3.  $H_0: \mu=174$ ,  $H_1: \mu \neq 174$ ,  $z = 3.0744$ ; reject  $H_0$
4.  $H_0: \mu=12000$ ,  $H_1: \mu > 12000$ ,  $z = 10.417$ ; reject  $H_0$
5.  $H_0: \mu_1 = \mu_2$ ,  $H_1: \mu_1 > \mu_2$ ,  $z = 1.319$ ; do not reject  $H_0$
6.  $H_0: \mu=10$ ,  $H_1: \mu \neq 10$ ,  $t = 0.771$ ; do not reject  $H_0$
7.  $H_0: \mu=17.5$ ,  $H_1: \mu > 17.5$ ,  $t = 1.296$ ; do not reject  $H_0$
8.  $H_0: \mu=8$ ,  $H_1: \mu \neq 8$ ,  $t = 1.782$ ; do not reject  $H_0$
9.  $H_0: \mu_1 = \mu_2$ ,  $H_1: \mu_1 \neq \mu_2$ ,  $t = -0.850$ ; do not reject  $H_0$
10.  $H_0: p=0.2$ ,  $H_1: p \neq 0.2$ ,  $z = 2.5$ ; do not reject  $H_0$
11.  $H_0: p_1 = p_2$ ,  $H_1: p_1 > p_2$ ,  $z = 1.108$ ; do not reject  $H_0$
12.  $H_0: \mu_d = 0$ ,  $H_1: \mu_d \neq 0$ ,  $t = 2.673$ ; reject  $H_0$

### Exercise 5: Chi-square Tests

1.  $\chi^2=10.00$ ; reject  $H_0$
2.  $\chi^2=1.15$ ; do not reject  $H_0$
3.  $\chi^2=1.78$ ; do not reject  $H_0$
4.  $\chi^2=1.4$ ; do not reject  $H_0$
5.  $\chi^2=7.464$ ; do not reject  $H_0$
6.  $\chi^2=12.4068$ ; reject  $H_0$

### Exercise 6: Linear Regression and Correlation

1. (a)  $\hat{y} = 12.062 + 0.777x$ ; (b)  $\hat{y} = 78$
2. (a)  $\hat{y} = 51.33 + 4.4x$ ; (b)  $\hat{y} = 84.33$ ; (c)  $x = 7.77$
3.  $\hat{y} = 6480x^{-1.04}$ ;  $\hat{y} = 12.75$
4.  $y/x = \alpha + \beta x$
5.  $r = 0.240$
6. (a)  $r = 0.872$ ; (b)  $r_s = 0.970$
7.  $r_s = 0.986$
9. (a) 15, 12; (b) 1.25; (c) do not reject  $H_0$
10. (b) For  $X_1: t = 2.50$ , reject  $H_0$ . For  $X_2: t = 1.25$ , do not reject  $H_0$
11. (a)  $\hat{Y} = -4243.1682 + 2.1315X_1 + 0.2135X_2$ ; (b) \$9,188
12. (a)  $\text{GR\AA}DE = -49.95 + 1.07\text{HOURS} + 1.36IQ + 2.04\text{BOOKS} - 1.80AGE$ ; (b) 76.7%;  
(c) around 77
13. (a) 5.77; (b) 4.12
14. (a)  $\hat{\text{Sales}} = 172 + 25.9 \text{Promot} - 13.2 \text{Comp} - 3.04 \text{Free}$ ; (b)  $t = -1.30$ , do not reject  $H_0$