

- $b_1 = 1.12$, X : Clients: (1D)
- $x = 23$, $\hat{y} = 17.7 + 1.12 \times 23 = 43.46$ (2C)
- $r^2 = \frac{SSR}{SST} = \frac{1227.4}{1564.2} = 0.7847$ (3B)

4. Since $S = \sqrt{\frac{SSE}{n-2}} = 5.8034$
 $S_{b_1} = \frac{S}{\sqrt{\sum (x_i - \bar{x})^2}} = \frac{5.8034}{\sqrt{979.7}} = 0.1854$

$\Rightarrow t_{calc} = b_1 / S_{b_1} = \frac{1.12}{0.1854} = 6.041$

(4D)

5. CV: $\pm t_{\alpha/2} = \pm t_{0.025}$ (DF = $n-2 = 12-2=10$)
 $= 2.2281$

Reject H_0 (5B)

6. $b_1 \pm t_{\alpha/2} S_{b_1} \Rightarrow 1.12 \pm 2.2281 \times 0.1854$
 $= [0.707, 1.533]$ (6D)

7. $\hat{y}_p \pm t_{\alpha/2} \times S \times \sqrt{\frac{1}{n} + \frac{(x_p - \bar{x})^2}{\sum (x_i - \bar{x})^2}}$
 $43.46 \pm 2.2281 \times 5.8034 \times \sqrt{\frac{1}{12} + \frac{(23 - 25.08)^2}{979.7}}$
 $= [39.63, 47.297]$ (7C)

S_i	e_i	$(S_i - e_i)^2 / e_i$
28	$(114 \times 50) / 200 = 28.5$	$(28 - 28.5)^2 / 28.5$
44	$(114 \times 70) / 200 = 39.9$	$(44 - 39.9)^2 / 39.9$
50	$(114 \times 80) / 200 = 45.6$	$(50 - 45.6)^2 / 45.6$
30	$(86 \times 50) / 200 = 21.5$	$(30 - 21.5)^2 / 21.5$
26	$(86 \times 70) / 200 = 30.1$	$(26 - 30.1)^2 / 30.1$
30	$(86 \times 80) / 200 = 34.4$	$(30 - 34.4)^2 / 34.4$

(8A)

DF = $k-1 = 2$, $\chi^2_{0.01} = 9.210$

9. Fail to reject H_0 (9D)

$b_0 = 33.946$, $b_1 = 0.5173$, $b_2 = -0.1644$ (10A)

11. $x_1 = 70, x_2 = 15, x_3 = 0$
 $\hat{y} = 33.946 + 0.5173 \times 70 - 0.1644 \times 15 - 1.0965 \times 0$
 $= 67.691$ (11D)

12. Variation in y that is explained by all x 's (2B)

13. CV: $t_{\alpha/2} = t_{0.05}$, DF = $n-3-1 = 20-3-1 = 16$
 $= 1.7459 \Rightarrow -1.0965 \pm 1.7459 \times 0.6888$
 $= [-2.2991, 0.10617]$ (13D)

14. Time: $t_{calc} = -2.284$ (14A)

15. P-value = $0.0308 < \alpha = 0.1 \Rightarrow$ Time is significant (15B)

16. $b_2 = -0.1644$ (16C)

17. $n=4$: $D_3 = 0, D_4 = 2.282, A_2 = 0.729$

$\bar{R} = 70.9/10 = 7.09, \bar{x} = 221.6/10 = 22.16$

R-chart: $UCL = \bar{R} D_4 = 7.09 \times 2.282 = 16.18$ (17D)

18. $LCL = \bar{R} D_3 = 7.09 \times 0 = 0$ (18A)

19. \bar{x} -chart $\bar{x} \pm A_2 \bar{R} = 22.16 \pm 0.729 \times 7.09$

$\Rightarrow UCL = 27.33, LCL = 16.99$ (19B)

20. \bar{x} -chart largest value: day 2 $29.7 > UCL$

At least one point is outside of control limits

(20A)

21. Center line: $p = \frac{41 + 26 + 32 + 28 + 39}{5 \times 200}$
 $= 0.166$ (21C)

22. $\sigma_p = \sqrt{\frac{0.166(1-0.166)}{200}} = 0.0263$

$UCL = 0.166 + 3 \times 0.0263 = 0.245$

$LCL = 0.166 - 3 \times 0.0263 = 0.087$ (22E)

23. Largest: day 1. $p_1 = \frac{41}{200} = 0.205 < UCL$

Smallest: day 2: $p_2 = \frac{26}{200} = 0.13 > LCL$

- All points are within control limits \Rightarrow (23B)
 - No pattern over time