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stats
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hw4: Sections 8.5-8.8: Exercises 8.38, 8.40, 8.41, 8.44, 8.45, 8.46, 8.51, 8.55
Study the textbook Examples in Sections 8.5-8.8. See Example Excel file q-q-plots.xlsx.

8.38 For a chi-squared distribution, find χ^2_α such that

a) $\chi^2_{0.005}$ when $v = 5$;

16.7500

b) $\chi_{0.05}$ when $v = 19$;

30.144

c) $\chi^2_{0.01}$ when $v = 12$;

26.217

8.40 For a chi-squared distribution, find χ^2_α such that a) $P(X^2 > \chi^2_\alpha) = 0.01$ when $v = 21$

$\chi^2_{0.01} = 38.932$

b) $P(X^2 < \chi^2_\alpha) = 0.95$ when $v = 6$

$\chi^2_{0.05} = 12.592$

c) $P(\chi^2_\alpha < X^2 < 23.209) = 0.01$ when $v = 10$

$$\begin{aligned} P(\chi^2_\alpha < X^2 < 23.209) &= P(\chi^2_\alpha < X^2) - P(X^2 > 23.209) \\ &= P(X^2 > \chi^2_\alpha) - 0.015 = 0.01 \\ &\rightarrow P(X^2 > \chi^2_\alpha) = 0.025 \\ &\rightarrow \chi^2_{0.025} = 20.483 \end{aligned}$$

8.41 Assume the sample variances to be continuous measurements. Find the probability that a random sample of 25 observations, from a normal population with variance $\sigma^2 = 6$, will have a sample variance S^2
(a) greater than 9.1;

$$P(S^2 > 9.1) = P(\chi^2_{24} > \frac{24 \cdot 9.1}{6})$$
$$= P(\chi^2 > 36.4)$$
$$= 0.05$$

(b) between 3.462 and 10.745.

$$P(3.462 < S^2 < 10.745) = P(13.848 < \chi^2_{24} < 42.980)$$
$$= 0.95 - 0.01$$
$$= 0.94$$

8.44
a) Find $t_{0.025}$ when $v = 14$.

$t_{0.025} = 2.145$

b) Find $-t_{0.10}$ when $v = 10$.

$-t_{0.10} = -1.372$

c) Find $t_{0.995}$ when $v = 7$.
$t_{0.995} = -3.4999$

8.45
a) Find $P(T < 2.365)$ when $v = 7$

$P(T < 2.365) = 1 - 0.025 = 0.975$

b) Find $P(T > 1.318)$ when $v = 24$.

$P(T > 1.318) = 0.10$

c) Find $P(-1.356 < T < 2.179)$ when $v = 12$.

$P(-1.356 < T < 2.179) = 1 - 0.025 - 0.1 = 0.875$
d) Find $P(T > -2.567)$ when $v = 17$.

$P(T > -2.567) = 1 - 0.01 = 0.99$

8.46
a) Find $P(-t_{0.005} < T < t_{0.01})$ for $v = 20$

$P(-t_{0.005} < T < t_{0.01}) = 1 - 0.01 - 0.005 = 0.985$

b) Find $P(T > -t_{0.025})$.

$P(T > -t_{0.025}) = 1 - 0.025 = 0.975$

8.51 For an $F - distribution$, find
a) $f_{0.05}$ with $v_1 = 7$ and $v_2 = 15$

$f_{0.05}(7, 15) = 2.71$

b) $f_{0.05}$ with $v_1 = 15$ and $v_2 = 7$

$f_{0.05}(15, 7) = 3.51$

c) $f_{0.01}$ with $v_1 = 24$ and $v_2 = 19$

$f_{0.01}(24, 19) = 2.92$
d) $f_{0.95}$ with $v_1 = 19$ and $v_2 = 24$

note: $f_{1-\alpha} = (v_1, v_2) = 1/f_{\alpha}(v_2, v_1)$

$f_{0.95}(19, 24) = 1/f_{0.05}(24, 19) = 1/2.11 = 0.4739$

e) $f_{0.99}$ with $v_1 = 28$ and $v_2 = 12$

by (note)

$f_{0.99}(28, 12) = 0.3448$

8.55 Construct a normal quantile-quantile plot of these data, which represent the diameters of 36 rivet heads in 1/100 of an inch.

6.72 6.75 6.72 6.76 6.74 6.72 6.77 6.66 6.76 6.70 6.81 6.82 6.66 6.76 6.78 6.79 6.70 6.64 6.68 6.76 6.78 6.78 6.76 6.66 6.67 6.66 6.70 6.73 6.62 6.70 6.76 6.62 6.80 6.72 6.72 6.76