

REDO 5-33 ASSUMING STRESS CONCENTRATION
FACTORS OF 2.5 IN BENDING & TORSION

FOR POINT A

$$\left. \begin{array}{l} \sigma_x = 8.378 \text{ MPa} \\ \tau_{xy} = 16.76 \text{ MPa} \end{array} \right\} \text{ FROM 5-33}$$

NOW

$$\sigma_x = 2.5(8.378) \text{ MPa} = 20.94 \text{ MPa}$$

$$\tau_{xy} = 2.5(16.76) \text{ MPa} = 41.90 \text{ MPa}$$

$$\sigma_{eq} = \sqrt{20.94^2 + 3(41.90)^2} = 75.5 \text{ MPa}$$

FOR POINT B

$$\left. \begin{array}{l} \tau_{xy} = 16.76 \text{ MPa} + 0.4 \text{ MPa} \\ \text{(TORSION + BENDING)} \end{array} \right\} \text{ FROM 5-33}$$

NOW

$$\tau_{xy} = 2.5(16.76 \text{ MPa}) + 0.4 \text{ MPa} = 42.3$$

$$\sigma_{eq} = \sqrt{3} 42.3 \text{ MPa} = 73.3 \text{ MPa}$$

SEE SPREADSHEET (PAGE 2) FOR OTHER ROWS

Data from Table P5-3										Prob. 5-36									
ROW	l (m)	a (m)	F (N)	od (m)	id (m)	Stresses at Point A (Mpa)				Stresses at Point B (Mpa)									
						Sigma	Tau-torsion	Tau-bending	von mises	Sigma	Tau-torsion	Tau-bending	von mises						
a	0.100	0.400	50	0.020	0.014	20.95	41.91	0	75.6	0	41.91	0.42	73.3						
b	0.070	0.200	85	0.020	0.006	19.10	27.29	0	51.0	0	27.29	0.40	48.0						
c	0.300	0.100	95	0.025	0.017	59.11	9.85	0	61.5	0	9.85	0.48	17.9						
d	0.800	0.500	160	0.046	0.022	35.35	11.05	0	40.2	0	11.05	0.17	19.4						
e	0.085	0.350	900	0.055	0.024	12.16	25.03	0	45.0	0	25.03	0.62	44.4						
f	0.050	0.180	950	0.050	0.030	11.12	20.02	0	36.4	0	20.02	1.01	36.4						
g	0.160	0.280	850	0.045	0.019	39.27	34.36	0	71.3	0	34.36	0.87	61.0						
h	0.200	0.100	800	0.040	0.024	73.18	18.29	0	79.7	0	18.29	1.33	34.0						
i	0.400	0.150	950	0.065	0.037	39.39	7.39	0	41.4	0	7.39	0.56	13.8						
j	0.200	0.100	600	0.045	0.032	45.08	11.27	0	49.1	0	11.27	1.02	21.3						
k	0.120	0.180	880	0.060	0.047	19.98	14.98	0	32.8	0	14.98	1.07	27.8						
l	0.150	0.250	750	0.052	0.028	22.26	18.55	0	39.1	0	18.55	0.66	33.3						
m	0.070	0.100	500	0.036	0.030	36.92	26.37	0	58.7	0	26.37	2.14	49.4						
n	0.085	0.150	820	0.040	0.015	28.31	24.98	0	51.7	0	24.98	1.01	45.0						