1 A	В	С	D	E	F	G	Н	I	J	K	L	ΜN
	MATI	LAB Pi	roject (#2) - Metallic	: Failure A	nalvsis							
3 5			ce Structural Analysis, Uni			go (Copyright	: J.B. Kosmati	ka, 2020)				
5		Version:	Winter, 2020 (v1)									
6			11						-			
7	Proj	ect Title:	Reader Example, Volume 1, p	page 239 (4.48),	2-D Stress Failu	re Analysis, 70	75-T6 Al	1	1 8			
8												
9		/ariable	Description	Value	Units				Units Re			
10		ilnput	Input Units	1	1 = US, 2 = SI	***************************************			US	SI		
11		iOutput	Output Units	1	1 = US, 2 = SI			σ, τ	$10^3 lb/in^2$	МРа		
12		ioption	Analysis Option	1	1 = Stress, 2 =	Strain		<i>E</i> , <i>G</i>	10 ⁶ lb/in ²	GPa		
13 14	N/	aterial Pro	norties			***************************************		*****************************				
15		/ariable	Description	A-Basis	B-Basis	Units						
16			Young's Modulus	10.3	10.3	Msi						
17		G	Shear Modulus	3.9	3.9	Msi						
18		$\sigma_{\scriptscriptstyle {\it yT}}$	Yield strength - tension	68	70	Ksi						
19		$\sigma_{\it uT}$	Ultimate strength - tension	78	80	Ksi						
20		$\sigma_{\it yC}$	Yield strength - compressio	-70	-73	Ksi			- I - I - I - I - I - I - I - I - I - I			
21	***************************************	$\sigma_{\it uC}$	Uultimate strength - compr	-78	-80	Ksi						
22			Yield strength - shear	35.25	35.25	Ksi						
23		τ_u	Ultimate strength - shear	46	48	Ksi					-	_
24 25	So	ıfety Facto										
26		Variable	Description	Value	Units							
27		SF _v	Safety Factor - yield	1.1	1						-	
28	***************************************	SF "	Safety Factor - ultimate	1.5	1							
29		u	,									
30												
31	х о	ption 1:	Applied Stress State		,							
32 33		l:l C+	Charta									
34		oplied Stre Variable	Description	Value	Units							
35			Stress (σ_{xx})	45	Ksi	************************						
36			Stress (σ_{yy})	15	Ksi						-	
37			Stress (σ_{zz})	0	Ksi							
38			Stress (τ _{yz})	0	Ksi							
39			Stress (τ _{xz})	0	Ksi							
40		τ_{xy}	Stress (τ _{xy})	20	Ksi							
41												
42												
	хо	ption 2:	Measured Strain State From	Rosettes	1							
44 45	St	rain Gage	Rosette									
46		/ariable	Description	Value	Units	1					-	
47			Orientation Angle (A)		degree		000000000000000000000000000000000000000					
48			Orientation Angle (B)		degree	1						
49			Orientation Angle (C)		degree						***************************************	
50		θ	Gage Rotation Angle		degree							
51												
52		easured S		Val	11							
53 54		/ariable	Description Strain (A)	Value	Units						-	
55			Strain (A) Strain (B)		μ in/in μ in/in						-	
56			Strain (B)		μ in/in	*****************************						
57		. (otrain (c)		r,						-	
58	1											

А	В	С	D	E	F	G	Н	I	J	K	L	ΜN
1	3.5.47	T	• (((2)) 3.5 (11)	E 1 G	4 7							_
2			roject (#2) - Metallic								<u> </u>	_
3	SE-16	0A Aerospa	ce Structural Analysis, Uni	versity of Califor	nia, San Dieg	o (Copyright J	.B. Kosmatko	a, 2020)				+
5		Version:	Winter, 2020 (v2) - Input: US	, Output: US/SI								
6											ļ	_
7			John Kosmatka A0123456789									_
9		student ib.	A0123430783									
10	P	roject Title:	Reader Example, Volume 1,	page 239 (4.48), 2	-D Stress Failur	e Analysis, 707	'5-T6 Al					1
11												
12	INPUT	ECHO:								ı		4
13		Variable	Description	Value	Units			Units Re	forence			_
15		ilnput	Input Units	1	1 = US, 2 = SI			US	SI		-	+
16		iOutput	Output Units	1	1 = US, 2 = SI		σ, τ	$10^{3} lb/in^{2}$	МРа			
17		loption	Analysis Option	1	1 = Stress, 2 = 9	Strain	E, G	10 ⁶ lb/in ²	GPa			
18					,		· · ·					
19		Material Pro										П
20		Variable	Description	A-Basis	B-Basis	Units					 	4
21		<i>E G</i>	Young's Modulus Shear Modulus	10.3000 3.9000	10.3000 3.9000	Msi Msi					 	+
23		$\sigma_{_{yT}}$	yield strength - tension	68.0000	70.0000	Ksi					 	
24		σ_{uT}	ultimate strength - tension	78.0000	80.0000	Ksi						
25		σ_{yc}	yield strength - compression	-70.0000	-73.0000	Ksi						
26		$\sigma_{\it uC}$	ultimate strength - compres	-78.0000	-80.0000	Ksi						↓
27		τ_y	yield strength - shear	35.2500	35.2500	Ksi					 	+
28		τ_u	ultimate strength - shear	46.0000	48.0000	Ksi					 	+
30		Safety Facto	ors									
31		Variable	Description	Value	Units							_
32		SF _y	Safety Factor - yield	1.1	1							
33		SF _u	Safety Factor - ultimate	1.5	1							
34		A li d Ct	Ct-t-									+
35 36		Applied Stree	Description	Value	Units							_
37		σ _{xx}	Normal Stress - x	45.0000	Ksi							_
38			Normal Stress - y	15.0000	Ksi							
39		σ_{zz}	Normal Stress - z	0.0000	Ksi							
40		τ_{yz}	Shear Stress - yz	0.0000	Ksi							
41		τ_{xz}	Shear Stress - xz	0.0000	Ksi						ļ	_
42		τ_{xy}	Shear Stress - xy	20.0000	Ksi						 	_
43												+-
45	OUTPL	UT:										
46												
47 48	1.)	Principal Str	ess State			1 1		i I		İ		-
48		Variable	Description	1	2	3	Units				 	
50		σ_p	Principal Stresses	0.0000	5.0000	55.0000	Ksi				†	
51				0.0000	0.4472	-0.8944	1					T
52		{Φ}	Eigenvector {Q}	0.0000	-0.8944	-0.4472	1					4
53 54				1.0000	0.0000	0.0000	1				 	+
55		Variable	Description	Value	Units						 	
56		τ _{max}	Maximum Shear Stress	27.5000	Ksi						 	
57											1	
58	<u> </u>	-	×10 ⁴			<u> </u>						П
59 60	<u> </u>		X IU								 	4
60	-	2.5									 	+
62		2					+-				†	
63		1.5										
64	<u> </u>										<u> </u>	+
65 66	-	1	/ /			1					 	+
67		_ 0.5	/_/			1	-				 	
68		(Si										T
69	<u> </u>	au (k				7						+
70 71	<u> </u>	-0.5	1 1				-				 	+
/1			11 1					1		1		

	АВ	С	D	E	F	G	Н	<u> </u>	J	K	l ı	ΜN
72		-1	\ \ \	'			<u></u>		,			1
73												
74		-1.5					+-					
75		-2										
76		-2										T
77		-2.5		$\overline{}$								Т
78		ļ										
79			0 1	2 3	4	5	6					
80		1		sigma (Ksi))	×	10 ⁴					
81	ļ <u>.</u>											
82	2.)	Allowable S	trengths						l .	l .		
84		Variable	Description	A-Basis	B-Basis	Units						+-
85		σ _T *	Allowable Tension	52.0000	53.3333	Ksi						+-
86		σ_{c}^{*}	Allowable Compression	-52.0000	-53.3333	Ksi						+
87		τ*	•	30.6667	32.0000	Ksi						+-
88		τ*	Allowable Shear Allow Shear Tresca (Mixed)	26.0000	26.6667	Ksi						+
89			Allow Silear Tresca (Mixeu)	20.0000	20.0007	K3I						+-
90	3)	Margin of S	afety (MS)	ļ					I	I	l	
91	3.,											П
92		Minimum N	largin of Safety	Rankine	Tresca*	Von Mises						
93			Min Margin of Safety (A Basi	-0.0545	-0.0545	-0.0129						
94			Min Margin of Safety (B Basi	-0.0303	-0.0303	0.0124						
95			, ,									
96		Applied Stre	ess State for (MS=0) - A Basis									
97		Variable	Description	Rankine	Tresca*	Von Mises	Units					
98		σ_{xx}	Normal Stress - x	42.5455	42.5455	44.4206	Ksi					
99		σ_{yy}	Normal Stress - y	14.1818	14.1818	14.8069	Ksi					
100		σ_{zz}	Normal Stress - z	0.0000	0.0000	0.0000	Ksi					
101		τ_{yz}	Shear Stress - yz	0.0000	0.0000	0.0000	Ksi					
102		τ_{xz}	Shear Stress - xz	0.0000	0.0000	0.0000	Ksi					
103		τ_{xy}	Shear Stress - xy	18.9091	18.9091	19.7425	Ksi					
104												
105		Applied Stre	ess State for (MS=0) - B Basis									
106		Variable	Description	Rankine	Tresca*	Von Mises	Units					
107		σ_{xx}	Normal Stress - x	43.6364	43.6364	45.5596	Ksi					
108		σ_{yy}	Normal Stress - y	14.5455	14.5455	15.1865	Ksi					
109		σ_{zz}	Normal Stress - z	0.0000	0.0000	0.0000	Ksi					
110		τ_{yz}	Shear Stress - yz	0.0000	0.0000	0.0000	Ksi					
111		τ_{xz}	Shear Stress - xz	0.0000	0.0000	0.0000	Ksi	-				
112		τ_{xy}	Shear Stress - xy	19.3939	19.3939	20.2487	Ksi					\perp
113												
114		* Note: For	r the Tresca Criteria; the Mar	• •		•						
115			for pure <u>tension</u> , MS is the								<u> </u>	\perp
116			for <u>pure compression</u> , MS is								<u> </u>	╨
117			for mixed stress, MS is the n	ninimum of tensio	n (σ _τ *), compre	ession (σ _c *), sh	near (τ*), and s	hear ((σ _τ *-σ _c	*)/4) criteria		<u> </u>	\perp
118	L .											
119	End o	f Output		ı								
120 121											 	+
121											 	+
144	1	1									<u> </u>	للللا