ERRATA for

FE Mechanical Practice Exam

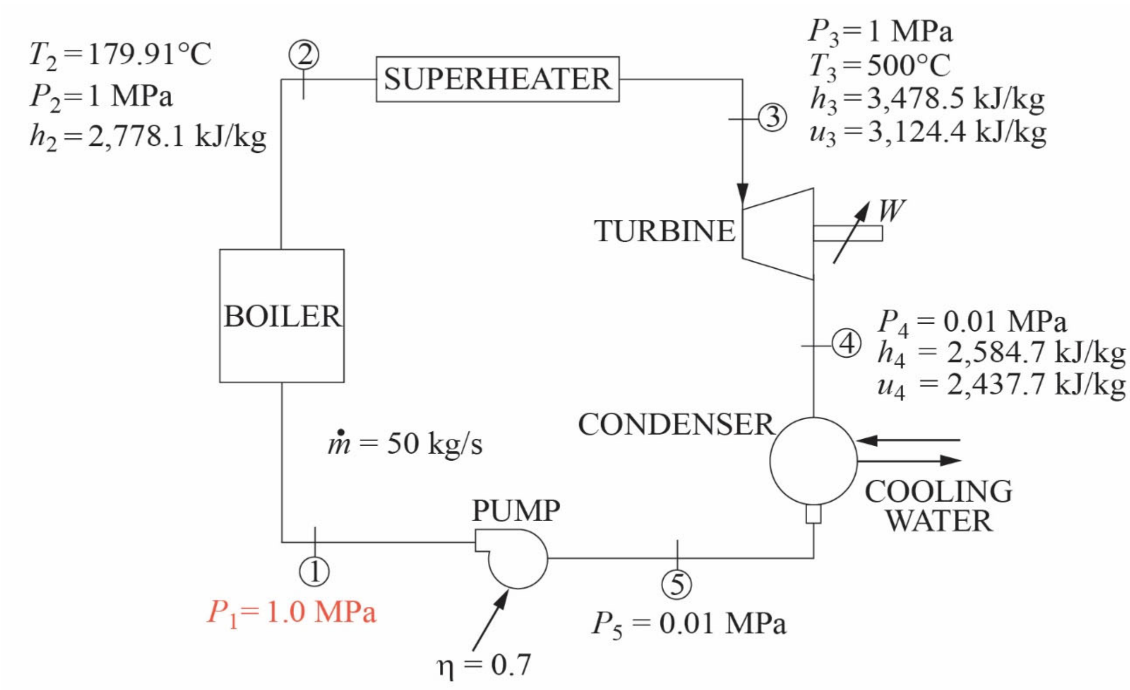
ISBN: 978-1-932613-99-5

Errata posted 10/01/2023

Revisions are shown in red.

Question 67, p. 44

The illustration should be shown as follows:



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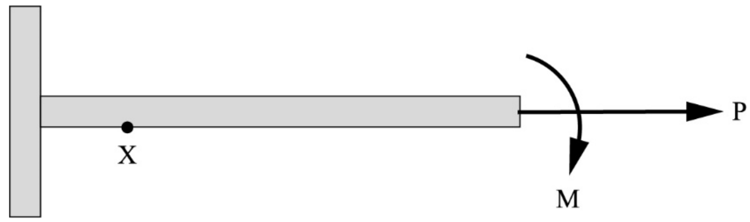
Question 91, p. 59
The question should be shown as follows:

Yielding is considered failure for the ductile beam shown. The following data apply:

Yielding first occurs at Point X.
S_y = 34 ksi
σ_2 = 0 ksi



The table below shows various calculated values for σ_1 and σ_3.

Based on maximum shear stress theory, select the column(s) that show the values at which failures will occur.

Stress	A	B	C	D	E	F
σ_1 (ksi)	35	24	45	60	18	82
σ_3 (ksi)	– 35	0	–35	–24	–62	–62

Solution Table, p. 66
No. 91—A, C, D, E, F

Solution 12, p. 70
~~Refer to the Intellectual Property section in the Ethics chapter of the *FE Reference Handbook.*~~

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THE CORRECT ANSWER IS: D

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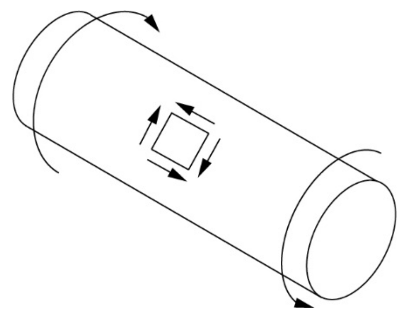
Solution 46, p. 91

Refer to the Torsion section in the Mechanics of Materials chapter of the *FE Reference Handbook.*



The polar moment of inertia for a solid cylinder is

$$J = \frac{\pi r^4}{2} = \frac{\pi\left(\frac{d}{2}\right)^4}{2} = \frac{\pi d^4}{2(2)^4} = \frac{\pi d^4}{2(16)} = \frac{\pi d^4}{32}$$

The equation for the shear stress

$$\tau = \frac{Tr}{J} = \frac{T\left(\frac{d}{2}\right)}{J}$$

Substituting for polar inertia into the equation for the shear stress gives

$$\tau = \frac{Tr}{J} = \frac{T\left(\frac{d}{2}\right)}{\frac{\pi d^4}{32}} = \frac{16T}{\pi d^3}$$

Solving for torque gives

$$T = \frac{\pi d^3 \tau}{16} = \frac{\pi(0.2)^3(840 \times 10^3)}{16}$$

$$T = 1{,}319 \text{ N·m}$$

THE CORRECT ANSWER IS: C

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Solution 91, p. 112
The solution should read as follows:

Refer to the Static Loading Failure Theories section in the Mechanical Engineering chapter of the *FE Reference Handbook*.

Maximum shear stress theory is used for the ductile material. Note: $\sigma_1 \geq \sigma_2 \geq \sigma_3$

Calculate $\tau_{max} = (\sigma_1 - \sigma_3)/2$ and compare with $S_y/2$.

Stress	A	B	C	D	E	F
Calculated τ_{max}	35	12	40	42	40	72
$\tau_{max} \geq 17$ ksi	fails	12–ok	fails	fails	fails	fails

THE CORRECT ANSWERS ARE: A, C, D, E, F

Solution 95, p. 114
Refer to the Hooke's Law section in the Mechanics of Materials chapter of the *FE Reference Handbook*.

The formula for the total longitudinal strain without a temperature rise is:

$$\varepsilon_{axial} = \frac{1}{E}\left(\sigma_l - v\left(\sigma_t + \sigma_r\right)\right) = \frac{1}{210 \times 10^3 \text{ MPa}}\left(23.1 \text{ MPa} - 0.24\left(46.2 \text{ MPa} + 0\right)\right) = 5.72 \times 10^{-5}$$

This must be converted to displacement using the following formula:

$$\varepsilon_{axial} = \frac{\delta l}{l}, \text{where } l \text{ is the length of the section under consideration}$$

$$\delta l = \varepsilon_{axial} \times l$$

$$= 5.72 \times 10^{-5} \times 1{,}000 \text{ mm}$$

$$= 0.0572 \text{ mm}$$

THE CORRECT ANSWER IS: A

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Solution 99, p. 117
The first line of the solution should read as follows:

Use the Failure by Pure Shear equation from the Joining Methods section in the Mechanical Engineering chapter of the *FE Reference Handbook*.