ERRATA for
FE Other Disciplines Practice Exam

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Errata posted 09/07/2022

Revisions are shown in red.

Question 11, p. 11
You are testing the mean sidewall strength of cans. A sample of eight independent cans has been tested, and the mean breaking strength of the sample is 153 psi. Past experience has shown that the population standard deviation is 3 psi. The probability that the mean breaking strength is less than 150 psi is most nearly:

Question 56, p. 32
A 1.5-kg projectile is to be fired by compressing a spring and then releasing it, as shown in the figure. The spring constant is 1,550 N/m, and the initial compression is 175 mm. Assume friction in the barrel is negligible. The velocity (m/s) of the projectile at Station 2 is most nearly:

Question 66, p. 38
The options should read as follows:

- ○ A. 33 MPa
- ○ B. 111 MPa
- ○ C. 21 GPa
- ○ D. 200 GPa

Solution 11, p. 62
The last line of the solution should read as follows:

$$X = Z_{\alpha/2} = 2.83$$

$$P(X \geq 2.83) = 1 - P(X \leq 2.83) = R(2.83) \approx 0.0026$$

Solutions Table, p. 58
56: A
99: D

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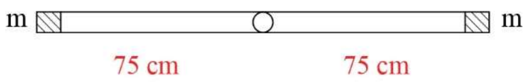
Solution 46, p. 73

Refer to the Dynamics chapter of the *FE Reference Handbook*.



$$I_1 = \frac{1}{12} m_n L^2 = \frac{2}{12}(15)^2 = 37.5 \text{ g cm}^2$$

$$I_2 = 3I_1 = 3(37.5) = 112.5 \text{ g cm}^2$$

$$I_2 = 37.5 + 2m\left(\frac{L}{2}\right)^2 = 37.5 + 2m(7.5)^2 = 37.5 + 112.5m = 112.5$$

$$m = 0.667\text{g}$$

Solution 56, p. 78

Refer to the Principle of Work and Energy section in the Dynamics chapter of the *FE Reference Handbook*.

Use energy balance to solve this problem.

Potential energy at compression = kinetic energy at the barrel exit

$$\frac{1}{2}ks^2 = \frac{1}{2}mv^2$$

where

v = velocity (m/s)

k = spring constant = 1,550 N/m

s = change in length of the spring from the undeformed length of the spring

= 175 mm = 0.175 m

m = mass = 1.5 kg

1 N = 1 kg•m/s^2

Therefore, kg may be expressed as N•s^2/m.

m = 1.5 N•s^2/m

(1,550 N/m) (0.175 m)^2 = (1.5 N•s^2/m) v^2

The unit on both sides is N•m as expected for energy.

Solve for v.

v = 5.625 m/s

THE CORRECT ANSWER IS: A

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Solution 66, p. 83
Refer to the Columns section in the Mechanics of Materials chapter of the *FE Reference Handbook* to determine the critical buckling stress. Pinned on both ends would be pinned-pinned, so $K = 1.0$.

Examinees are expected to know that E is the elastic modulus in this question. From the Typical Material Properties table, determine that steel has $E = 200$ GPa, and GPa = 10^9 N/m^2.

$$\sigma_{cr} = \frac{\pi^2 E}{\left(\frac{Kl}{r}\right)^2} \frac{\pi^2\left(200\times10^9\,\frac{\text{N}}{\text{m}^2}\right)}{\left(\frac{1.0\times20\text{ m}}{0.15\text{ m}}\right)^2} = \frac{1.974\times10^{12}\,\frac{\text{N}}{\text{m}^2}}{17,778} = 111\text{ MPa}$$

THE CORRECT ANSWER IS: B

Solution 83, p. 91
Refer to the First Law of Thermodynamics section in the Thermodynamics chapter of the *FE Reference Handbook* for special cases of closed systems and Charles' Law.

$w_b = P\Delta v$
$w_b = 100$ kPa (1,000 L – 500 L)

$$w_b = \frac{(100\,\text{kPa})(500\,\text{L})\left(1,000\,\frac{\text{Pa}}{\text{kPa}}\right)\left(1\,\frac{\text{N/m}^2}{\text{Pa}}\right)}{\left(1,000\,\frac{\text{L}}{\text{m}^3}\right)\left(1\,\frac{\text{N}\bullet\text{m}}{\text{J}}\right)}$$

$w_b = 50,000$ J
$w_b = 50$ kJ

Solution 99, p. 97

THE CORRECT ANSWER IS: D