*Allowed Materials: pencils and/or pens.*     **THIS IS YOUR EXAM FORM # -->**   ExamForm := 15

*Honor Statement:* *On my honor, I promise that I have not received any unauthorized assistance on this exam (I didn't look at another student's paper, I didn't view any unauthorized written materials, I didn't talk or listen to another student, I didn't use an unauthorized calculator, I didn't use any electronic device, any visual or auditory signals, or any other techniques of exchanging information with others.) I have maintained the highest standards of academic integrity while completing this exam.*

         *Signed:_____*

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### 1. *(2 point deduction for failure to complete this problem!)*

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| Bubble: | For Course Section: | |
|---|---|---|
| 01 | 001 | Hollins |
| 02 | 002 | Reeves |
| 03 | 003 | Reis |

- Write in all of the indicated information in the boxes of your response form.
- Darken the appropriate circles to encode the corresponding information.
- Write your name on this exam and sign the Honor Statement.

Notes:
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| Exam Form | Program |
|---|---|
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| | ⊙ CMEN |
| | ⊙ CVEN |
| | ⊙ CVTE |
| ⓪ ⓪ | ⊙ CYEN |
| ① ① | ○ ELEN |

| Last Name | | | | | | | | | | F.I. | M.I. | LA Tech Username | | | | | | Course # | | | Section (last 2 digits) |
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| Ⓐ | Ⓐ | Ⓐ | Ⓐ | Ⓐ | Ⓐ | Ⓐ | Ⓐ | Ⓐ | Ⓐ | Ⓐ | Ⓐ | Ⓐ | Ⓐ | Ⓐ | ⓪ | ⓪ | ⓪ | ⓪ | ⓪ | ⓪ | ⓪ |

$$\text{Choices} = \begin{pmatrix} \text{"A"} & \text{"I properly completed all required items in problem 1, so I will not lose these points"} \\ \text{"B"} & \text{"I did not properly complete problem 1 because I am fine with losing these points."} \end{pmatrix}$$

Please put your final answers on the answer sheet that was given to you. You must show your work to receive full credit.

Unless the problem states otherwise, assume that the atmospheric pressure is 101.325 kPa or 14.7 psia.

Read the questions carefully and CHECK YOUR UNITS.

If you made any marks in your steam table, please erase them before turning in your packet.

Good luck!

**2.** (10 points) Fill in the blanks for the following statement:
The state of a simple compressible system is completely specified by
_____, _____, _____ properties.

(Bubble in all answer choices that apply; partial credit available. The order does not matter.)

$$
\text{Choices} = \begin{pmatrix}
\text{"A"} & \text{"intensive"} \\
\text{"B"} & \text{"independent"} \\
\text{"C"} & \text{"one"} \\
\text{"D"} & \text{"chemical"} \\
\text{"E"} & \text{"dependent"} \\
\text{"F"} & \text{"extensive"} \\
\text{"G"} & \text{"three"} \\
\text{"H"} & \text{"two"} \\
\text{"I"} & \text{"magical"}
\end{pmatrix}
$$

**4.** (10 points) Which law states: If two bodies are in thermal equilibrium with a third body (e.g. with a thermometer), they are also in equilibrium with each other.

$$
\text{Choices} = \begin{pmatrix}
\text{"A"} & \text{"2nd Law of Thermodynamics"} \\
\text{"B"} & \text{"1st Law of Thermodynamics"} \\
\text{"C"} & \text{"3rd Law of Thermodynamics"} \\
\text{"D"} & \text{"4th Law of Thermodynamics"} \\
\text{"E"} & \text{"0th Law of Thermodynamics"} \\
\text{"F"} & \text{"Murphy's Law"}
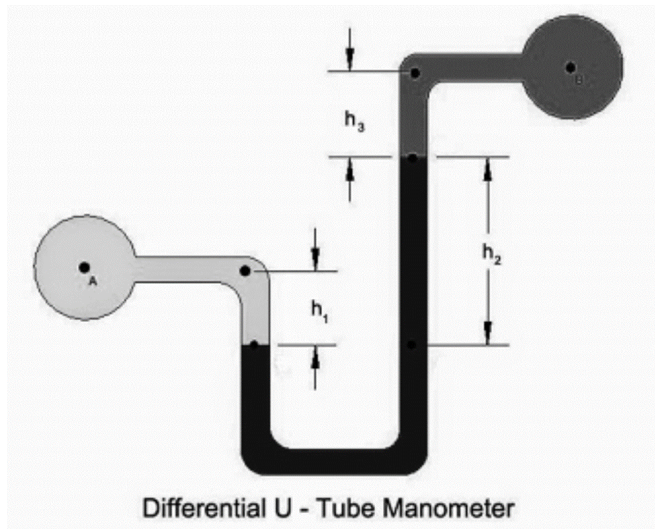\end{pmatrix}
$$

**6** (10 points) A hydraulic lift is used to lift a large $\text{mass} = 870 \cdot \text{kg}$ using oil (SG = 0.8) as the working fluid. If the diameters of the two ends of the lift are $D_1 = 10 \cdot \text{cm}$ and $D_2 = 87 \cdot \text{cm}$, the force required on the small end is closest to:

(Neglect any elevation difference between the two ends)

$$\text{Choices} = \begin{pmatrix} \text{"A"} & 102 \\ \text{"B"} & 106 \\ \text{"C"} & 109 \\ \text{"D"} & 113 \\ \text{"E"} & 116 \\ \text{"F"} & 120 \\ \text{"G"} & 123 \\ \text{"H"} & 127 \end{pmatrix} \cdot \text{N}$$

**8.** (10 points) Given the following illustration, the pressure at A (far left) is $P_A = 81.4 \cdot \text{psi}$, the pressure at B (far right) is $P_B = 79.9 \cdot \text{psi}$, $h_1 = 5$ in (and the density of the fluid on the left is 60 lbm/ft³), the density of the fluid in the middle is $= 110 \cdot \dfrac{\text{lbm}}{\text{ft}^3}$, and $h_3 = 17$ in (and the fluid on the top right is 80 lbm/ft³). The value of $h_2$ is closest to:

$$\text{Choices} = \begin{pmatrix} \text{"A"} & 9.99 \\ \text{"B"} & 10.96 \\ \text{"C"} & 11.95 \\ \text{"D"} & 12.94 \\ \text{"E"} & 13.93 \\ \text{"F"} & 14.91 \\ \text{"G"} & 15.89 \\ \text{"H"} & 16.87 \end{pmatrix} \cdot \text{in}$$

Differential U - Tube Manometer

(Figure not drawn to scale)

**10.** (10 points) A manometer is attached to a tank filled with water and air. Given the heights and specific gravities of oil and mercury, the gage pressure of the air is closest to:
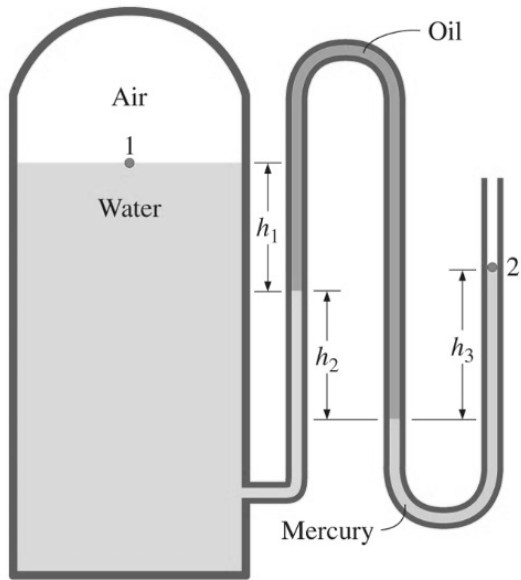


$h_1 = 9.1 \cdot cm$

$h_2 = 8.9 \cdot cm$

$h_3 = 10 \cdot cm$

$SG_{oil} = 0.86$

$SG_{mercury} = 13.6$

$$\text{Choices} = \begin{pmatrix} "A" & 9.32 \\ "B" & 9.91 \\ "C" & 10.51 \\ "D" & 11.10 \\ "E" & 11.70 \\ "F" & 12.29 \\ "G" & 12.89 \\ "H" & 13.49 \end{pmatrix} \cdot kPa$$

(Figure not drawn to scale)

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# 1. *(2 point deduction for failure to complete this problem!)*

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Good luck!

$$Key =$$

| | 1 |
|---|---|
| 1 | |
| 2 | "ABH" |
| 3 | |
| 4 | "E" |
| 5 | |
| 6 | "D" |
| 7 | |
| 8 | "E" |
| 9 | |
| 10 | "E" |
| 11 | |