Unit 04: Application of Differential Analysis

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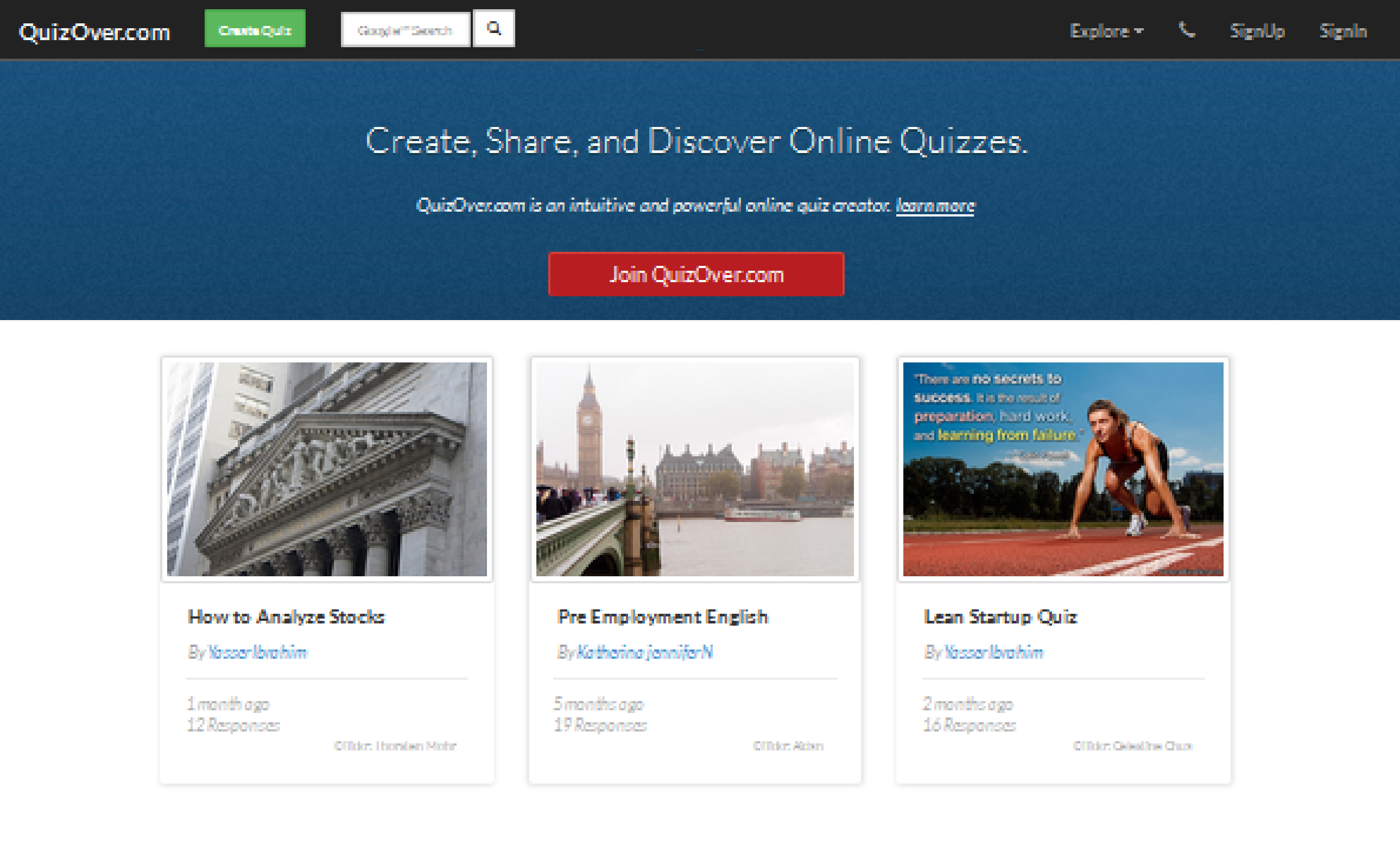
Published 2014



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Stephanie Redfern and Tuan Dinh. Fluid Mechanics. The Saylor Foundation, http://www.saylor.org/courses/me201/

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4. Chapter: Unit 04: Application of Differential Analysis

4.1.1. Which of the following expresses the continuity equation (conservat...

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Which of the following expresses the continuity equation (conservation of mass) for an incompressible fluid at steady state?

Please choose only one answer:

- $$ \bf{v} = 0$$
- $$ {{\partial \bf{v}} \over {\partial t}} + \nabla \cdot t = 0 $$
- $$\bf{\nabla \cdot v} = 0$$
- $$ {{\partial \rho} \over {\partial t}} + \bf{v} = 0 $$

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Question: Which of the following expresses the Stephanie Redfern Saylor Fluid

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4.1.2. In the notation of your resource materials for Unit 4 (page 20), wh...

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In the notation of your resource materials for Unit 4 (page 20), which of the following terms in the Navier-Stokes equations represents momentum transport by convection?

Please choose only one answer:

- v[sub]r[/sub]/r[sup]2[/sup]
- v [sub]r[/sub] v[sub]r[/sub]/r
- -p/r
- \-   v[sub]r[/sub]/z

4.1.3. In your resource materials for Unit 4, what does represent?

Author: Stephanie Redfern

In your resource materials for Unit 4, what does represent?

Please choose only one answer:

- g
- p/h
- gz
- /p

Check the answer of this question online at QuizOver.com:
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4.1.4. Integration of the momentum conservation equation for fully develop...

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Integration of the momentum conservation equation for fully developed pipe flow leads to a term C[sub]1[/sub] ln r. Which of the following are good arguments for C[sub]1[/sub] being zero? I. The velocity is finite at the center of the pipe. II. The velocity is azimuthally symmetric (does not depend on angle). III. The velocity is zero at the wall (no slip). IV. The radial gradient of velocity at the center of the pipe is zero.

Please choose only one answer:

- I, II, and IV only
- I and IV only
- II only
- II and IV only
- III only

4.1.5. For liquid flow in an open channel, which of the following is an ap...

Author: Stephanie Redfern

For liquid flow in an open channel, which of the following is an appropriate boundary condition for the liquid flow problem at the liquid-gas interface?

I. The velocity of the gas is zero at the interface.

II. The velocity of the gas and liquid are the same at the interface.

III. There is no momentum transfer across the interface.

IV. The velocity gradients of the gas and liquid are the same at the interface.

Please choose only one answer:

- I only
- I and II only
- I and IV only
- IV only
- II and III only

4.1.6. For liquid flow in an open channel, which of the following is an ap...

Author: Stephanie Redfern

For liquid flow in an open channel, which of the following is an appropriate boundary condition for the liquid flow problem at the liquid-solid interface at the bottom of the channel?

Please choose only one answer:

- No slip
- Zero velocity gradient
- Zero velocity
- Zero normal stress

4.1.7. Which of the following best represents the simplified conservation ...

Author: Stephanie Redfern

Which of the following best represents the simplified conservation of axial momentum equation in differential form for fully developed pipe flow of a Newtonian fluid? (Here w is the axial velocity component.) I. $${{1}\over{r}} {{\partial}\over{\partial r}} (r {{\partial w} \over {\partial r}})= - {{1}\over{\mu}} {{\partial p}\over{\partial z}}$$ II. $${{1}\over{r}} {{\partial}\over{\partial r}} (w {{\partial w} \over {\partial r}})= {{1}\over{\mu}} {{\partial p}\over{\partial z}}$$ III. $${{1}\over{r}} {{\partial}\over{\partial r}} (r {{\partial w} \over {\partial r}})= {{1}\over{\mu}} {{\partial p}\over{\partial z}}$$ IV. $${{1}\over{r}} {{\partial}\over{\partial r}} (r {{\partial w} \over {\partial r}})= {{w}\over{\mu}} {{\partial p}\over{\partial z}}$$

Please choose only one answer:

- I only
- II only
- III and IV only
- I, II, and IV only
- II and III only

Check the answer of this question online at QuizOver.com:
Question: Which of the following best represents Stephanie Redfern Saylor Fluid

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