



## Quiz 3 (conceptual questions)

10 questions | 11 participated

### 1. To which ones of the following is Euler associated? (Multiple Choice) \*

11/11 (100%) answered

Necessary condition that serves as the differential equation ✓ (7/11) 64%

The concept of variation (3/11) 27%

Variational derivative ✓ (10/11) 91%

Sufficient condition for calculus of variations problems (1/11) 9%

### 2. Functions that serve as state variables should belong to... (Multiple Choice) \*

11/11 (100%) answered

Sobolev space ✓ (8/11) 73%

Banach space ✓ (4/11) 36%

Hardy space (0/11) 0%

$C^1$  (space of differentiable functions) (4/11) 36%

### 3. Functions that serve as the optimization variables should belong to... (Multiple Choice) \*

11/11 (100%) answered





Functional space (https://us02web.zoom.us/)

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Sobolev space	(2/11) 18%
$C^0$ (continuous functions)	(4/11) 36%
$C^1$ (differentiable functions)	(0/11) 0%

#### 4. Is norm of a vector space a functional? (Single Choice) \*

11/11 (100%) answered

Yes ✓	(11/11) 100%
No	(0/11) 0%
May be	(0/11) 0%
Never	(0/11) 0%

#### 5. Which one of the following is a vector space? (Multiple Choice) \*

11/11 (100%) answered

Sobolev space ✓	(10/11) 91%
Banach space ✓	(9/11) 82%
Lebesgue space ✓	(8/11) 73%
Hilbert space ✓	(10/11) 91%

#### 6. Which one of the two is a stronger than the other: Gateaux variation and Frechet differential? (Single Choice) \*

11/11 (100%) answered





Gateaux variation is stronger than Frechet differential  
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Support (https://us02web.zoom.us/zendesk/sso?return\_to=https://support.zoom.us/hc/en-us) English ▼ (2/11) 18%

Frechet differential is stronger than Gateaux variation ✓

(9/11) 82%

Cannot be concluded from their definitions

(0/11) 0%

7. Which one of these equivalent to virtual displacement? (Multiple Choice) \*

11/11 (100%) answered

Variation of the displacement ✓

(9/11) 82%

Weak variable corresponding to the displacement (as in the finite element method) ✓

(10/11) 91%

Lagrange multiplier corresponding to the governing differential equation ✓

(2/11) 18%

The inverse function of the displacement

(0/11) 0%

8. Which ones of the following are equivalent? (Multiple Choice) \*

11/11 (100%) answered

Newton's second law ✓

(10/11) 91%

Hamilton's principle ✓

(9/11) 82%

D'Alembert's principle ✓

(9/11) 82%

Maxwell's reciprocity theorem

(0/11) 0%

9. A vertex in 3D trusses has this many degrees of freedom. (Single Choice) \*

11/11 (100%) answered

1

(0/11) 0%



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3 ✓ (11/11) 100%

4 (0/11) 0%

**10. Lagrange multiple corresponding to a less-or-equal-to inequality constraint is... (Multiple Choice) \***

11/11 (100%) answered

always non-negative ✓ (10/11) 91%

could be zero ✓ (5/11) 45%

could be negative (1/11) 9%

indicative of the sensitivity of the objective function relative to the sensitivity of the corresponding constraint ✓ (6/11) 55%

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