MCQPy Example Quiz

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Exam Information

This provides some extra information about the quiz or exam. For example, you might include instructions for students here. This example includes questions demonstrating various features of MCQPy, including

- Multiple choice questions with single and multiple correct answers
- Questions with one or more figures
- Questions with mathematical notation using LaTeX, for both question text and answer choices.
- Questions with highlighted code snippets

Question 1 **[1 points]**

Select <u>one</u> answer

This is a regular question without anything too fancy. What is the correct answer?

(a) ☐ Not the correct answer

(b) ☐ The correct answer

(c) ☐ Another wrong answer

(d) ☐ Yet another wrong answer

Question 2 [1 points]

Select <u>one</u> answer

What does the below equation represent?

$$\phi(x) = \begin{cases} \alpha(e^x - 1) & \text{if} x < 0 \\ x & \text{if} x \geq 0 \end{cases} \tag{1}$$

(a) ☐ The Exponential Linear Unit (ELU) activation function

(b) ☐ The Schrödinger equation

(c) ☐ The Fourier transform

(d) ☐ The Cauchy-Riemann equations

Question 3 [1 points]

Select <u>one</u> answer

What is the correct formulation of the time-independent Schrödinger equation?

(a) ☐ $E = mc^2$

(b) ☐ $F = ma$

(c) ☐ $a^2 + b^2 = c^2$

(d) ☐ $V = IR$

(e) ☐ $pV = nRT$

(f) ☐ $-\frac{\hbar^2}{2m}\nabla^2\psi + V\psi = E\psi$

Question 4 [1 points]

Select <u>one</u> answer

What is shown in the image?

Figure: The picture that goes with the question.

(a) ☐ A cute dog

(b) ☐ A german shepherd

(c) ☐ A beach

(d) ☐ All of the above

Question 5 [1 points]

Select <u>one</u> answer

Which image is taken in the capital city of France?

(a) Figure (a)

(b) Figure (b)

(c) Figure (c)

(d) Figure (d)

(a) ☐ Figure (a)

(b) ☐ Figure (b)

(c) ☐ Figure (c)

(d) ☐ Figure (d)

Question 6 [1 points]

Select <u>one</u> answer

What does the code below do?

```
1 def example_function(x):
2     return x * 2
```

(a) ☐ Calculates the square of the input value

(b) ☐ Computes double the input value

(c) ☐ Returns the input value unchanged

(d) ☐ Finds the factorial of the input value

Question 7 [1 points]

Select all correct answers

Which code snippets implements a function that returns the square of a number?

```
def square(x):
    return x * x
```

```
def square(x):
    return x + x
```

```
def square(x):
    return x ** 3
```

```
def square(x):
    return x - x
```

```
def square(x):
    return x**2
```

(a) ☐ First code snippet

(b) ☐ Second code snippet

(c) ☐ Third code snippet

(d) ☐ Fourth code snippet

(e) ☐ Fifth code snippet

Question 8 [1 points]

Select <u>one</u> answer

In line 12 of the following code snippet, what is the meaning of `x` and `edge_index`?

```
1  import torch
2  import torch.nn.functional as F
3  from torch_geometric.nn import GCNConv
4
5  class GCN(torch.nn.Module):
6      def __init__(self):
7          super().__init__()
8          self.conv1 = GCNConv(dataset.num_node_features, 16)
9          self.conv2 = GCNConv(16, dataset.num_classes)
10
11     def forward(self, data):
12         x, edge_index = data.x, data.edge_index
13
14         x = self.conv1(x, edge_index)
15         x = F.relu(x)
16         x = F.dropout(x, training=self.training)
17         x = self.conv2(x, edge_index)
18
19         return F.log_softmax(x, dim=1)
```

(a) ☐ They are the input features and edge indices of the graph data, respectively.

(b) ☐ They are the output features and edge indices of the graph data, respectively.

(c) ☐ They are the weights and biases of the GCN layer, respectively.

(d) ☐ They are the node features and edge indices of the graph data, respectively.

(e) ☐ They are the activation functions applied to the graph data, respectively.

Question 9 [1 points]

Select <u>one</u> answer

In the following Rust code snippet, what happens when the function `main` is called?

```rust
fn drink(beverage: &str) {
    // You shouldn't drink too many sugary beverages.
    if beverage == "lemonade" { panic!("AAAaaaaa!!!!"); }

    println!("Some refreshing {} is all I need.", beverage);
}

fn main() {
    drink("water");
    drink("lemonade");
    drink("still water");
}
```

(a) ☐ The program prints a message and successfully drinks all beverages.

(b) ☐ The program panics immediately without printing any message.

(c) ☐ The program prints a message for water and still water, but panics when trying to drink lemonade.

(d) ☐ The program prints a message for water, but panics when trying to drink lemonade and exits before reaching still water.

Question 10 [1 points]

Select <u>one</u> answer

Consider the following partial differential equation describing heat diffusion in a non-uniform medium:

$$\frac{\partial u}{\partial t} = \nabla \cdot (\kappa(\mathbf{x}, t)\nabla u) + f(\mathbf{x}, t)$$

where $u(\mathbf{x}, t)$ is the temperature field, $\kappa(\mathbf{x}, t)$ is the spatially and temporally dependent thermal conductivity, and $f(\mathbf{x}, t)$ is a heat source term. Given the boundary condition $u(\mathbf{x}, 0) = u_0(\mathbf{x})$ and the Green's function solution:

$$u(\mathbf{x}, t) = \int_\Omega G(\mathbf{x}, \mathbf{y}, t)u_0(\mathbf{y})\, d\mathbf{y} + \int_0^t \int_\Omega G(\mathbf{x}, \mathbf{y}, t - \tau)f(\mathbf{y}, \tau)\, d\mathbf{y}\, d\tau$$

Which statement best describes the physical interpretation of this solution?

(a) ☐ The first integral represents the response to initial conditions; the second represents accumulated heat sources over time

(b) ☐ Both integrals represent only the effect of boundary conditions

(c) ☐ The solution requires κ to be constant throughout the domain

(d) ☐ The Green's function is independent of the heat source term f