### Task 1

Find Gateaux derivatives for the given functions of two variables and integral functionals:

|  |  |  |
| --- | --- | --- |
| variant | function  | functional |
| 1 |  |  |
| 2 |  |  |
| 3 |  |  |
| 4 |  |  |

### Task 2

Find the adjoint operator for the given operator on the space of the smooth functions with zero values on the boundary of the given interval [0,1].

1. 

2. 

3. 

### Task 3

Find the derivatives of the following functionals:



Determine the gradient method for these problems.

**Task 4**

Find the derivative and determine the gradient method for the following problems with unknown function *v*:

1) 

2) 

3) 

**Task 5**

Find the derivative and determine the gradient method for the following problems with unknown function *v*:

1) 

2) 

3) 

4) 

**Task 6**

Find the derivative and determine the gradient method for the following problems with unknown function *v*:

1) 

2) 

3) 

**Task 7**

Find the derivative and determine the gradient method for the following problems with unknown function *v*:

1) 

2) 

3) 

**Task 7**

Find the derivative and determine the gradient method for the following problems with unknown function *v*:

1) 

2) 

3) 

4) 