Assignment 3

The due date for submitting this assignment is the 23rd of June, 23:59 IST.

1. The essential value of the cross product V(x,y) is _________
   - Type your answer here.

2. The essential value of the least component of x and y is _________
   - Type your answer here.

3. The essential value of the second component of x and y is _________
   - Type your answer here.

4. Start with the initial guess of (x0, y0) = (0, 0). Take the value of learning rate = 0.1. The value of x after 2 iterations of gradient descent will be _________
   - Type your answer here.

5. Start with the initial guess of (x0, y0) = (0, 0). Take the value of learning rate = 0.1. The value of y after 2 iterations of gradient descent will be _________
   - Type your answer here.

6. The absolute value of the difference between the values of J after the 4th and 6th iteration is _________
   - Type your answer here.

7. The dimension of x is _________
   - Type your answer here.

8. Start with the initial guess of (x0, y0) = (0, 0). Take the value of learning rate = 0.1. The value of x after 4 iterations of gradient descent will be _________
   - Type your answer here.

9. Start with the initial guess of (x0, y0) = (0, 0). Take the value of learning rate = 0.1. The value of y after 4 iterations of gradient descent will be _________
   - Type your answer here.

10. Start with the initial guess of (x0, y0) = (0, 0). Take the value of learning rate = 0.1. The value of J after 4 iterations of gradient descent will be _________
    - Type your answer here.

Based on the data provided below, answer questions 7-10. We consider a function we want to minimize

\[ J(x) = \frac{1}{2} (y - x^T w)^2 \]

where the constants \( x \) and \( y \) are provided in the table below.

<table>
<thead>
<tr>
<th>( x )</th>
<th>( y )</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.5</td>
</tr>
<tr>
<td>2</td>
<td>0.25</td>
</tr>
<tr>
<td>3</td>
<td>0.5</td>
</tr>
<tr>
<td>4</td>
<td>0.75</td>
</tr>
<tr>
<td>5</td>
<td>1.0</td>
</tr>
</tbody>
</table>

Determine the values for questions 7-10.