

**Test Preview****TestSummary.txt: 1/1****Jin Ha - jsh114:c4**

```
1: Test Preview: Summary for jsh114 of c4
2: -----
3:
4:   Public Tests:
5:     Marks for coding exercises:: 10 / 10
6:
7: Git Repo: git@gitlab.doc.ic.ac.uk:lab1819_autumn/496differentiation_jsh114.git
8: Commit ID: aba0f
```

```
1: # -*- coding: utf-8 -*-
2:
3: """
4: Use this file for your answers.
5:
6: This file should be in the root of the repository
7: (do not move it or change the file name)
8:
9: """
10:
11: # NB this is tested on python 2.7. Watch out for integer division
12:
13: import numpy as np
14:
15: def grad_f1(x):
16:     """
17:     4 marks
18:
19:     :param x: input array with shape (2, )
20:     :return: the gradient of f1, with shape (2, )
21:     """
22:     x1, x2 = x
23:     dx1 = 8*x1 - 2*x2 -1
24:     dx2 = 8*x2 - 2*x1 -1
25:     return np.array([dx1, dx2])
26:
27: def grad_f2(x):
28:     """
29:     6 marks
30:
31:     :param x: input array with shape (2, )
32:     :return: the gradient of f2, with shape (2, )
33:     """
34:     x1, x2 = x
35:     dx1 = (2*x1-2)*np.cos(x1**2+x2**2-2*x1+1) + 6*x1 - 2*x2 - 2
36:     dx2 = 2*x2*np.cos(x1**2+x2**2-2*x1+1) + 6*x2 - 2*x1 + 6
37:     return np.array([dx1, dx2])
38:
39: def grad_f3(x):
40:     """
41:     This question is optional. The test will still run (so you can see if you are
correct by
42:     looking at the testResults.txt file), but the marks are for grad_f1 and grad_f2
only.
43:
44:     Do not delete this function.
45:
46:     :param x: input array with shape (2, )
47:     :return: the gradient of f3, with shape (2, )
48:     """
49:     x1, x2 = x
50:
51:     dx1 = (
52:         (2*x1-2)*np.exp(-x1**2-x2**2+2*x1-1) +
53:         (6*x1-2*x2-2)*np.exp(-3*x1**2-3*x2**2+2*x1*x2+2*x1-6*x2-3) +
54:         float(20*x1)/(100*x1**2+100*x2**2+1)
55:     )
56:
57:     dx2 = (
58:         (2*x2)*np.exp(-x1**2-x2**2+2*x1-1) +
59:         (6*x2-2*x1+6)*np.exp(-3*x1**2-3*x2**2+2*x1*x2+2*x1-6*x2-3) +
60:         float(20*x2)/(100*x1**2+100*x2**2+1)
61:     )
62:
63:     return np.array([dx1, dx2])
64:
```

## Test Preview

testResults.txt: 1/1

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```
1: ----- Test Output -----
2:
3:
4: ----- Test Errors -----
5: ...
6: -----
7: Ran 3 tests in 0.001s
8:
9: OK
```