

```
1  '''
2  Created on 14 Oct 2014
3  @author: bob
4  '''
5  class Function(object):
6      '''
7      A class to represent function objects, these functions
8      must be able to be evaluated and to be derived at some point.
9      '''
10     def __init__(self, delta=0.001):
11         '''
12         Constructor
13         '''
14         self._DELTA = delta
15         pass
16     def evaluate(self, x):
17         '''
18         A method to evaluate the function
19         '''
20         raise NotImplementedError
21     def derivative(self, x):
22         '''
23         A method to calculate the derivative of the function
24         '''
25         return (self.evaluate(x+self._DELTA/2) - self.evaluate(x-self._DELTA/2))/self._DELTA
26 class P(Function):
27     def __init__(self, Ksqr, sigma, g, wsqr):
28         Function.__init__(self)
29         self.Ksqr = Ksqr
30         self.sigma = sigma
31         self.g = g
32         self.wsqr = wsqr
33     def evaluate(self, x):
34         return self.wsqr*(rho0(self.Ksqr, self.sigma, self.g, self.wsqr).evaluate(x))
35
36 class Q(Function):
37     def __init__(self, Ksqr, sigma, g, wsqr):
38         Function.__init__(self)
39         self.Ksqr = Ksqr
40         self.sigma = sigma
41         self.g = g
42         self.wsqr = wsqr
43     def evaluate(self, x):
44         return self.Ksqr*((rho0(self.Ksqr, self.sigma, self.g, self.wsqr).evaluate(x)) -
45                             (rho0(self.Ksqr, self.sigma, self.g, self.wsqr).evaluate(x-self._DELTA/2)))
46
47 class rho0(Function):
48     def __init__(self, Ksqr, sigma, g, wsqr):
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```
49         Function.__init__(self)
50         self.Ksqr = Ksqr
51         self.sigma = sigma
52         self.g = g
53         self.wsqr = wsqr
54     def evaluate(self, x):
55         return (1+self.sigma*x)
```