Midterm Question 4

May 4, 2018

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In [1]: from sympy import*
        %matplotlib inline
        import matplotlib.pyplot as plt
        from __future__ import division
        x, y, z, t = symbols('x y z t')
        k, m, n = symbols('k m n', integer = True)
        f, g, h = symbols('f g h', cls = Function)
        import math
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In [2]: def f(t):
            return 0.148148148*exp(-0.666666666*t)*t**2
```

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In [3]: def compositeSimpson(startPoint, endPoint, numIntervals):
            a = startPoint
            b = endPoint
            n = numIntervals
            h = (b - a) / n
            leftRight = f(a) + f(b)
            oddSum = 0
            evenSum = 0
            for i in range (1, n):
                x = a + i*h
                if i % 2 == 1:
                    oddSum = oddSum + f(x)
                else:
                    evenSum = evenSum + f(x)
            areaEstimate = h * (leftRight + 2*evenSum + 4*oddSum) / 3
            return areaEstimate
```

```
In [4]: xlist = []
        ylist = []
        x = 0
        h = 0.0001
        for i in range(0, 100):
            new_y = f(x) / (1 - compositeSimpson(0, x, 100))
            ylist = ylist + [new_y]
            xlist = xlist + [x]
            x = x + 100/100
```

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        i = i + 1

    plt.plot(xlist, ylist, 'o')
```