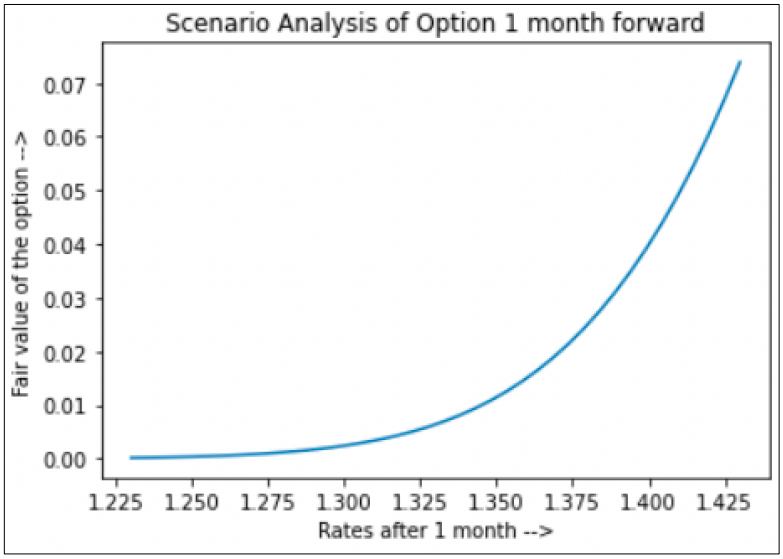
- I began by deciding the intervals over which the rate can change across the period of 1 month.
- Each interval is 0.05%. The values with which the initial r0 will change is shown in the image below. (As I used linspace to get these intervals they are shown until the 8th decimal place)

```
[-0.1        -0.09487179 -0.08974359 -0.08461538 -0.07948718 -0.07435897
 -0.06923077 -0.06410256 -0.05897436 -0.05384615 -0.04871795 -0.04358974
 -0.03846154 -0.03333333 -0.02820513 -0.02307692 -0.01794872 -0.01282051
 -0.00769231 -0.0025641   0.0025641   0.00769231  0.01282051  0.01794872
  0.02307692  0.02820513  0.03333333  0.03846154  0.04358974  0.04871795
  0.05384615  0.05897436  0.06410256  0.06923077  0.07435897  0.07948718
  0.08461538  0.08974359  0.09487179  0.1        ]
```

- We add these "jumps" to r0, thus getting a possible value of r0 (after 1 month)
- These values of r0 are then used to calculate the fair value of the option, with a time to maturity of 2 months.
- The possible rate values are then graphed against the fair values of the option. This gives the following graph:



- Thus, we can see that as the rate increases the value of the option increases as we get closer to our strike "price" (rate).
- Code:

```
def calculateD(self):
    # calculating the Z value to get the normal distribution
    #print(self.scenarios) #uncomment to view the "jumps" in the rate
    for i in self.scenarios:
        self.rates.append(i+self.r0)
        d2=(m.log((self.r0+i)/self.K)+(self.r - 0.5*self.sigma**2)*
               (self.T-self.t))/(self.sigma*m.sqrt(self.T-self.t))
        self.Nd2.append(norm.cdf(d2))

def calculateValue0(self):
    self.calculateD()
    # calculating the normal value
    # final value calcualated using Black-Scholes Analytic
    for i in self.Nd2:
        self.v0.append(i*m.e**(-self.r*(self.T-self.t)))
    return (self.v0)

def graphScenario(self):
    plt.plot(self.rates, self.v0)
    plt.xlabel("Rates after 1 month -->")
    plt.ylabel("Fair value of the option -->")
    plt.title("Scenario Analysis of Option 1 month forward")
    plt.show()
```