**Project 7**

MGMTMFE 405

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Question 1.

𝛥𝑋 = 𝜎√𝛥

|  |  |  |  |
| --- | --- | --- | --- |
|  | Explicit | implicitly | CN method |
| **Pu** | **0.502236** | **-0.502236** | **-0.251118** |
| **Pm** | **-8e-05** | **2.00008** | **1.50004** |
| **Pd** | **0.497764** | **-0.497764** | **-0.248882** |

𝛥𝑋 = 𝜎√3𝛥

|  |  |  |  |
| --- | --- | --- | --- |
|  | Explicit | implicitly | CN method |
| **Pu** | **0.167958** | **-0.167958** | **-0.0839788** |
| **Pm** | **0.666587** | **1.33341** | **1.16671** |
| **Pd** | **0.165376** | **-0.165376** | **-0.0826878** |

𝛥𝑋 = 𝜎√4𝛥

|  |  |  |  |
| --- | --- | --- | --- |
|  | Explicit | implicitly | CN method |
| **Pu** | **Pu : 0.126118** | **Pu : -0.126118** | **Pu : -0.063059** |
| **Pm** | **Pm : 0.74992** | **Pm : 1.25008** | **Pm : 1.12504** |
| **Pd** | **Pd : 0.123882** | **Pd : -0.123882** | **Pd : -0.061941** |

III

We compared the put option price of produced by three methods with the value calculated from the Black Scholes formula. We can see from the graph that all of the three methods give a good approximation of the Black-Scholes values. The Cranck Nicholson Method and Implicitly methods outperforms the Explicitly methods, giving a much closer estimation of the option price.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **BS** | **Explicit** | **Implicity** | **Crank Nicholson** |
| **European Put option** | **0.4647** | **0.48584** | **0.463115** | **0.463416** |

Question 2.

|  |  |  |  |
| --- | --- | --- | --- |
|  | Explicit | implicitly | CN method |
| **Call option** | **0.622911** | **0.660353** | **0.660819** |
| **Put option** | **0.497392** | **0.48076** | **0.481251** |

