Homework #6

Shenrui Jin

V=0.3;

alpha=1;

B=0.1;

gamma=0.2;

S=100;

K=100;

T=1;

div=0;

r=0.025;

Rho=-1;

lamda=0;

x=log(S);

d1=@(u) sqrt(((Rho.\*gamma.\*(1+1i.\*u))-(alpha+lamda)).^2-gamma.^2.\*(1i.\*u-u.^2));

D1=@(u) d1(u)./gamma^2.\*((((d1(u)+Rho.\*gamma.\*(1+1i.\*u)-(alpha+lamda))/(d1(u)-Rho.\*gamma.\*(1+1i.\*u)+(alpha+lamda))).\*exp(-d1(u).\*T)-1)/ ...

(((d1(u)+Rho.\*gamma.\*(1+1i.\*u)-(alpha+lamda))/(d1(u)-Rho.\*gamma.\*(1+1i.\*u)+(alpha+lamda))).\*exp(-d1(u).\*T)+1)-(Rho.\*gamma.\*(1+1i.\*u)-(alpha+lamda))/d1(u));

d2=@(u) sqrt((Rho.\*gamma.\*1i.\*u-(alpha+gamma)).^2+gamma.^2.\*(1i.\*u+u.^2));

D2=@(u)d2(u)./gamma^2.\*((((d2(u)+Rho.\*gamma.\*1i.\*u-(alpha+lamda))/(d2(u)-Rho.\*gamma.\*1i.\*u+(alpha+lamda))).\*exp(-d2(u).\*T)-1)/ ...

(((d2(u)+Rho.\*gamma.\*1i.\*u-(alpha+lamda))/(d2(u)-Rho.\*gamma.\*1i.\*u+(alpha+lamda))).\*exp(-d2(u).\*T)+1)-(Rho.\*gamma.\*1i.\*u-(alpha+lamda))/d2(u));

C1=@(u) r.\*1i.\*u.\*T-alpha.\*B./gamma.^2.\*(-(alpha+lamda-Rho.\*gamma.\*(1+1i.\*u))+sqrt((alpha+lamda-Rho.\*gamma.\*(1+1i.\*u)).^2+gamma.^2.\*(u.^2-1i.\*u)).\*T)-2.\*alpha.\*B./gamma.^2.\*(log(1+(-(alpha+lamda-Rho.\*gamma.\*(1+1i.\*u))+sqrt((alpha+lamda-Rho.\*gamma.\*(1+1i.\*u)).^2+gamma.^2.\*(u.^2-1i.\*u)))./((alpha+lamda-Rho.\*gamma.\*(1+1i.\*u))+sqrt((alpha+lamda-Rho.\*gamma.\*(1+1i.\*u)).^2+gamma.^2.\*(u.^2-1i.\*u))).\*exp(-sqrt((alpha+lamda-Rho.\*gamma.\*(1+1i.\*u)).^2+gamma.^2.\*(u.^2-1i.\*u)).\*T))-log(1+(-(alpha+lamda-Rho.\*gamma.\*(1+1i.\*u))+sqrt((alpha+lamda-Rho.\*gamma.\*(1+1i.\*u)).^2+gamma.^2.\*(u.^2-1i.\*u)))./((alpha+lamda-Rho.\*gamma.\*(1+1i.\*u))+sqrt((alpha+lamda-Rho.\*gamma.\*(1+1i.\*u)).^2+gamma.^2.\*(u.^2-1i.\*u)))));

C2=@(u) r.\*1i.\*u.\*T-alpha.\*B./gamma.^2.\*(-(alpha+lamda)+sqrt((alpha+lamda).^2+gamma.^2.\*(u.^2+1i.\*u))).\*T-1./gamma.^2.\*(log(1+(-(alpha+lamda)+sqrt((alpha+lamda).^2+gamma.^2.\*(u.^2+1i.\*u)))./((alpha+lamda)+sqrt((alpha+lamda).^2+gamma.^2.\*(u.^2+1i.\*u))).\*exp(-T.\*sqrt((alpha+lamda).^2+gamma.^2.\*(u.^2+1i.\*u))))-log(1+(-(alpha+lamda)+sqrt((alpha+lamda).^2+gamma.^2.\*(u.^2+1i.\*u)))./((alpha+lamda)+sqrt((alpha+lamda).^2+gamma.^2.\*(u.^2+1i.\*u)))));

f1=@(u) exp(C1(u).\*T+D1(u).\*T.\*V+1i.\*u.\*x);

f2=@(u) exp(C2(u).\*T+D2(u).\*T.\*V+1i.\*u.\*x);

func1=@(u) real(exp(-1i.\*u.\*log(K)).\*f1(u)./(1i.\*u));

func2=@(u) real(exp(-1i.\*u.\*log(K)).\*f2(u)./(1i.\*u));

pi1=0.5+1./pi\*integral(func1,0.001,5000);

pi2=0.5+1./pi\*integral(func2,0.001,1000000000000);

>> hw6

C =

18.5702

Call =

13.0514

Put =

10.5824