Assignment 2

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1)

2)

3)4) **European Call Option**

$$r=10\%$$

$$k=49$$

$$t=2 months=\frac{2}{12}$$

$$p=\frac{e^{rt}-d}{u-d}$$

$p=\frac{e^{\left(0.1\right)(\frac{2}{12})}-0.96}{1.06-0.96}$=0.568

$$1-p=0.432$$

$$e^{-\left(0.1\right)\left(\frac{2}{12}\right)}\left(4\*0.568+0\*0.432\right)=2.23$$



5) **European Put Option**

$$r=8\% compound quarterly$$

$$k=40$$

$$t=2 months=\frac{2}{12}$$

$$p=\frac{\left(1+\frac{P}{4}\right)^{4}-d}{u-d}$$

$$p=\frac{(1+0.02)^{4}-0.875}{1.125-0.875}=0.8297$$

$$1-p=0.1703$$

$$(1+0.02)^{-4}\left(4\*0.8297+0\*0.1703\right)=3.06$$



6) **European Call Option**

$$r=5\%$$

$$k=51$$

$$t=3 months=\frac{3}{12}$$

$p=\frac{e^{\left(0.05\right)(\frac{3}{12})}-0.95}{1.06-0.95}$=0.569

$$1-p=0.431$$

$$e^{-\left(0.05\right)(\frac{3}{12})}\left(5.18\*0.569+0\*0.431\right)=2.91$$

$$e^{-\left(0.05\right)(\frac{3}{12})}\left(2.91\*0.569+0\*0.431\right)=1.64$$



7) **European Put Option**

$$r=5\%$$

$$k=51$$

$$t=3 months=\frac{3}{12}$$

$p=\frac{e^{\left(0.05\right)(\frac{3}{12})}-0.95}{1.06-0.95}$=0.569

$$1-p=0.431$$

$$e^{-\left(0.05\right)(\frac{3}{12})}\left(0\*0.569+0.65\*0.431\right)=2.777$$

$$e^{-\left(0.05\right)(\frac{3}{12})}\left(0.65\*0.569+5.875\*0.431\right)=2.866$$

$$e^{-\left(0.05\right)(\frac{3}{12})}\left(0.277\*0.569+2.866\*0.431\right)=1.375$$



**Put Call Parity**

$$C+Ke^{-rt}=P+S\_{o}$$

$$1.64+51e^{-\left(0.05\right)\left(\frac{6}{12}\right)}=1.38+50$$

$$51.38=51.38$$

8)

$$25e^{\left(0.1\right)(\frac{2}{12})}=27+23(1-p)$$

$$p=0.605$$

$$27^{2}p+23^{2}\left(1-p\right)=650$$

$$650e^{\left(0.1\right)\left(\frac{2}{12}\right)}=639.26$$

9) a) European Put Option

$$r=12\%$$

$$k=42$$

$$t=3 months=\frac{3}{12}$$

$p=\frac{e^{\left(0.12\right)(\frac{3}{12})}-0.9}{1.1-0.9}$=0.652

$$1-p=0.348$$

$$e^{-\left(0.12\right)(\frac{3}{12})}\left(0\*0.625+2.4\*0.348\right)=0.81$$

$$e^{-\left(0.12\right)\left(\frac{3}{12}\right)}\left(2.4\*0.625+9.6\*0.348\right)=4.76$$

$$e^{-\left(0.12\right)\left(\frac{3}{12}\right)}\left(0.81\*0.625+4.76\*0.348\right)=2.12$$



9) b) American Put Option

$$r=12\%$$

$$k=42$$

$$t=3 months=\frac{3}{12}$$

$p=\frac{e^{\left(0.12\right)(\frac{3}{12})}-0.9}{1.1-0.9}$=0.652

$$1-p=0.348$$

$$e^{-\left(0.12\right)\left(\frac{3}{12}\right)}\left(0.81\*0.625+6\*0.348\right)=2.54$$



10)

$$r=12\%$$

$$k=42$$

$$t=3 months=\frac{3}{12}$$

$$σ=0.3$$

$$u=e^{σ \sqrt{∆t}}=1.16$$

$$d=\frac{1}{u}=0.86$$

$$p=\frac{1.01-0.86}{1.16-0.86}=0.5$$

$$\left(1-p\right)=0.5$$

$$e^{-\left(0.12\right)\left(\frac{3}{12}\right)}\left(13.82\*0.5+0\*0.5\right)=6.84$$

$$e^{-\left(0.12\right)\left(\frac{3}{12}\right)}\left(6.84\*0.5+0\*0.5\right)=3.37$$

