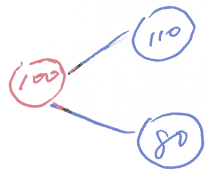
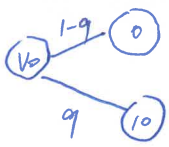
1.



3-month.



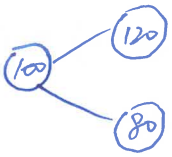
Put $k=90$.

$$q=\frac{110-100e^{r\cdot\frac{3}{12}}}{110-80}=\frac{1}{3}e^{\frac{r}{4}}$$

$$V_0=e^{-\frac{r}{4}}\left(\frac{1}{3}e^{\frac{r}{4}}\times 10+\left(1-\frac{1}{3}e^{\frac{r}{4}}\right)\times 0\right)=6.2$$

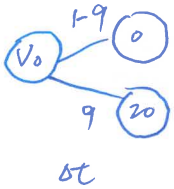
$r\approx 0.3011$

2.



Put $k=100$.

continuously compound $r=5\%$.

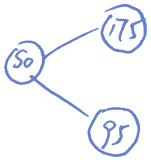


$$q=\frac{120-100e^{5\%\Delta t}}{120-80}=\frac{6-5e^{5\%\Delta t}}{2}$$

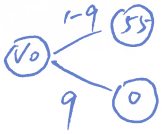
$$V_0=e^{-5\%\Delta t}\left(\frac{6-5e^{5\%\Delta t}}{2}\times 20+\left(1-\frac{6-5e^{5\%\Delta t}}{2}\right)\times 0\right)=6.24$$

$\Delta t=1.2974$

3.



6-month.



call $k=120$.

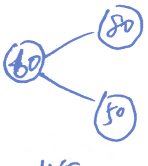
continuously compound $r=5\%$.

$$q=\frac{175-S_0e^{5\%\times\frac{1}{2}}}{175-95}=\frac{175-S_0e^{5\%\times\frac{1}{2}}}{80}$$

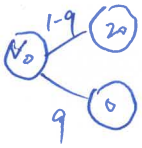
$$V_0=e^{-5\%\times\frac{1}{2}}\left(\frac{175-S_0e^{5\%\times\frac{1}{2}}}{80}\times 0+\left(1-\frac{175-S_0e^{5\%\times\frac{1}{2}}}{80}\right)\times 55\right)=1.$$

$S_0=94.11$

4.



1yr.



call $k=60$.

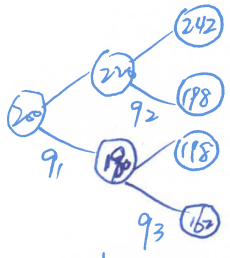
continuously compound $r=5\%$.

$$b=\frac{V_+-V_-}{S_+-S_-}=\frac{20-0}{80-50}=\frac{2}{3}$$

$$a=e^{-5\%\times 1}(V_+-bS_+)$$

$$=e^{-5\%}(20-\tfrac{2}{3}\times 80)=-31.7076.\Rightarrow \text{borrow } 31.7076.$$

5.



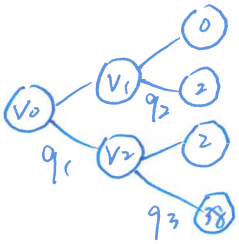
6-month

continuously compound $r=5\%$, 6-month

$$q_2=\frac{242-220e^{5\%\times\frac{1}{2}}}{242-198}\approx 0.3734$$

$$q_3=\frac{198-180e^{5\%\times\frac{1}{2}}}{198-162}\approx 0.3734$$

$$q_1=\frac{220-200e^{5\%\times\frac{1}{2}}}{220-180}\approx 0.3734.$$



$$V_1=e^{-5\%\times\frac{1}{2}}(q_2\times 2+(1-q_2)\times 0)\approx 0.7284$$

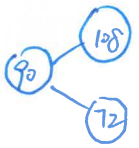
$$V_2=e^{-5\%\times\frac{1}{2}}(q_3\cdot 38+(1-q_3)\times 2)=e^{-5\%\times\frac{1}{2}}(0.3734\times 38+0.6266\times 2)\approx 15.06$$

$$V_0=e^{-5\%\times\frac{1}{2}}(q_1\times 15.06+(1-q_1)\times 0.7284)$$

$$=e^{-5\%\times\frac{1}{2}}(0.3734\times 15.06+0.6266\times 0.7284).$$

$$\approx 5.93$$

6.



1 yr.

call $k=?$ continuously compound $r=5\%$.

$b=0.5$

$$b=\frac{V_+-V_-}{S_+-S_-}=\frac{108-k-0}{108-72}=0.5 \quad k=q_0.$$