Easefolio Second Round Brain Teaser

1. The "Saturn Fund" is raising $100m to invest in a private equity rollup strategy. They will invest in 10 deals at $10m of equity each and raise $1m from 100 investors. The fund will have a 10 year life. Projected returns are 15%/year base case, 9%/year bear case, and 21%/year bull case. The discount (or risk free) rate is 10%/year.
   a. In the base case, what are the total fund profits in real and nominal dollars?
      i. *Hint, total gross profits=nominal, total gross profits-risk free profits=real*
   b. What is the bear, bull, and base MOIC (multiple on invested capital) per investor?
   c. Assume that at the end of the fund's lifetime it gets acquired by an even bigger private equity firm for $500m. Build a waterfall distribution with the following structure *(please look up "Private Equity Waterfall" if unfamiliar terminology)*
      i. 1.8x MOIC hurdle to investors
      ii. After 1.8x MOIC to investors, 20% share to the General Partner (GP) up to a 2.7x MOIC to investors (or "LPs").
         - *Please note that a Limited Partner (LP) is an investor while the GP is the operator that runs the fund strategy.*
         - *The GPs collect performance and sometimes management fees.*
         - *This question is only asking you to calculate performance fees.*
      iii. After a 2.7x MOIC is returned to investors, a 30% profit share to the GP.
2. The "Venus Fund" is an open end fund (also called an "evergreen fund") which focuses on trading cryptocurrencies and stocks. Their target annual returns are 27%/year before any fees. The fund has an annual hurdle rate for investors (see "Private Equity Waterfall" research suggestion and point 1.b.i. above) of 10%. The GP profit share is 20% over the 10% hurdle and 30% if a 27% return to investors is achieved. Please model the following
   a. 3 investors join in 2017 for $100k each.
   b. The fund purchased $250k of BTC in January of 2018.
   c. 2 new investors join for $100k each in 2019.
   d. The fund purchases $150k of ETH shortly after.
   e. The fund also purchases $100k of Tesla in 2019.
   f. In 2020, the first investor pulls out his entire account and the second investor pulls out 50% of their money. The other investors remain in the fund.
   g. *Please clarify the assumed price of each asset you purchase and back up your math. Make sure to include the necessary waterfall calculations.*
   h. *Fund calculations beyond EOY 2021 ("Projections") are not required.*

Creating a free Easefolio account to help guide your model is allowed but not encouraged. No completed demo logins will be shared until after your submission is reviewed.