QUESTION HAS THREE PARTS (A, B, C) FOR A TOTAL OF 16 MINUTES.

Carolyn Lopez is a 46-year-old Cardiovascular Surgeon. She is meeting with Andrew Hilton, a financial advisor, to organize her finances. During the interview process, Carolyn tells Hilton that she has been investing in venture capital funds. At the same time, Hilton notes that Carolyn has been purchasing Treasury Inflation Protected Securities (TIPS) with a maturity of 5 years. Carolyn acknowledges that she can earn a higher return by investing in other fixed income securities but the fact that her real return remains unaffected by changes in inflation makes her feel content.

A. **Describe** Carolyn's utility function. **Contrast** her utility function with that assumed in traditional finance theory.

(5 minutes)

Carolyn prides herself on being a long term investor who really commits and backs her investments to perform well and she sticks with them even when markets are not performing well. She sets a return objective of 20% on all her venture capital investments and until that objective isn't met, she does not sell. A doctor by profession, Carolyn is also an avid CNBC and Bloomberg viewer and reads the Wall Street Journal daily so that she can remain informed about any major financial news. Recently her investment advisor recommended her to invest in a small technology company which develops applications for androids and smartphones but after some research on the web, she trusted her intuition and did not invest. After some time, the technology company was acquired by a major mobile phone manufacturer and its stock prices went up drastically.

Hilton believes that Carolyn exhibits behavioral biases that interfere with an optimal investment allocation.

B. **Discuss** how Carolyn's behavior reflects:

i. Anchoring bias.
ii. Overconfidence bias.

Explain how a rational economic individual in traditional finance would behave differently with respect to *each* bias.

(6 minutes)

Carolyn holds a meeting with her investment manager every month and just like the very first meeting, she discusses her risk tolerance, investment objectives and constraints and whether there has been a change in any of them since the last meeting. The investment manager then adjusts the portfolio while keeping in mind the relative correlations between different asset classes. Recently her portfolio was modified by replacing stocks with Money market instruments Hilton believes her portfolio allocation is not consistent with the Mean-Variance Framework (MVF) and that it has elements of the Behavioral Portfolio theory (BPT) as he perceives different asset allocations as layers. Hilton also observes that Carolyn's asset allocation always includes Treasury bonds and he thinks this is associated with mental accounting bias as she never invests all of her portfolio in risky assets.

C. **Determine** whether Hilton's observation about Carolyn's portfolio allocation is correct. **Justify** your response with appropriate reasons.

(5 minutes)

Topic: Behavioral Finance. **Minutes:** 16

Part A

Carolyn has a risk-seeking (convex) utility function for gains and a risk-averse (concave) utility function for losses. This is described by the Friedman-Savage Double-Inflection utility function with an inflection point where the function shifts from concave to convex. This type of function explains why people may take low-probability, high-payoff risks (e.g. investing in venture capital funds) while at the same time insuring against low-probability, low-payoff risks (e.g. investing in TIPS). The concave portion of the utility function explains investing in low-payoff TIPS, while the convex portion of the function explains venture capital investments.

Traditional finance theory assumes risk aversion (concave utility function) at all levels of wealth, which would lead to rejection of all speculative investments having a negative expected return.

Template for Part B

Behavioral bias	**Discuss how Carolyn's behavior reflects *each* bias.**	**Explain how a rational economic individual in traditional finance would behave differently with respect to *each* bias.**
i. Anchoring bias.	Carolyn exhibits an anchoring bias as she has anchored a return of 20% in her mind and even when market conditions are not favorable, she is still not prepared to budge from her return objective.	A rational economic individual recognizes the prevailing economic and market conditions and takes the best decisions in light of the current circumstances and future forecasts so that an optimal investment plan can be achieved.
ii. Overconfidence bias.	Carolyn exhibits an overconfidence bias as despite the recommendation of her investment advisor, she demonstrated unwarranted faith in her intuitive reasoning and judgment. She turned down the advice based on very little research and trusted her cognitive abilities more than the information provided by the investment advisor.	A rational economic individual: • Should review his portfolio performance over at least two years so that not only does he recall the winners but also acknowledges all the losers which he picked based on his misguided belief in identifying a good investment. • Should be objective when evaluating investments and should identify the reasons behind the results of investments so that they do not lead to self-attribution and overconfidence. • Should perform a post-investment analysis so that he can separate good decisions from bad ones.

Part C

Hilton is incorrect that Carolyn's portfolio allocation is inconsistent with the Mean-Variance Framework (MVF) and that it has elements of the Behavioral Portfolio Theory (BPT). An MVF investor constructs portfolios keeping in mind his risk tolerance, investment objectives and constraints, and circumstances. Carolyn's portfolio is mean-variance efficient as it incorporates all of these while also considering the relative correlation of returns between different asset classes.

Hilton is also incorrect in classifying different asset allocations as layers because layers, referred to in BPT, are mutually exclusive and they do not take into account the relative correlations between different asset classes. Simply having bonds as an asset class does not categorize an investor as someone exhibiting mental accounting bias. A traditional investor can be risk averse and allocate considerable fraction of his portfolio to Fixed Income Securities. A BPT investor will have multiple attitudes towards risk depending on which part of their wealth is being considered which is unlike traditional investors.