Problem Set #1

Deadline to submit through Blackboard: 5pm Monday September 21, 2020.

Instructions: Answer completely each of the assigned questions and include all necessary supporting work. Students may work in groups of *up to three total students*. All group members' names should be clearly identified at the top of the submitted assignment. Each group must work independently of other groups. Identical work submitted by multiple groups constitutes academic dishonesty.

Assignments shall be submitted through Blackboard. Please designate only one student to submit the group's assignment. Late assignments will not be accepted. Failure to follow instructions will result in a reduced grade.

Problem 1: Index Construction [35 points]

| Stock | Day 0 | | Day 1 | | Day 2 | |
	Price	Shares Outstanding	Price	Shares Outstanding	Price	Shares Outstanding
1	5	80,000,000	5.25	80,000,000	5.5	80,000,000
2	150	1,500,000	145	1,500,000	144	1,500,000
3	200	500,000	190	500,000	185	500,000
4	75	10,000,000	76	10,000,000	77	10,000,000
5	60	5,000,000	61	5,000,000	63	5,000,000
6	99	2,500,000	100	2,500,000	105	2,500,000

a. [3 points] ** initially only stocks 1 through 5 are in the index ** Day 0 is the first day of the index (referred to as index inception date). Assume the index is market-capitalization weighted and compute the index divisor such that the index level is 100 on Day 0.

b. [3 points] Use the above information to compute the return to the index on Day 1 assuming it is market-capitalization weighted. Report the new index level and the index return.

c. [3 points] At the end of Day 1, the index committee removes stock #3 and replaces it with stock #6. Using the above information, compute the new index divisor after the replacement.

d. [3 points] Compute the Day 2 return to the index. Report the new index level and the index return.

e. [3 points] Now assume Stock 1 splits 2-for-1 at the end of Day 2 and at the new price is 2.75 and shares outstanding are 160 million. What is the new index divisor at the end of Day 2?

f. [15 points] Repeat a. to e. for a price-weighted version of the index.

g. [5 points] Compute the Day 1 return to a version of this index that is equally weighted. At the end of Day 1, assuming no rebalancing since Day 0, what will be the new weights? If the index were to be rebalanced to restore equal weights at the end of Day 1, indicate the necessary adjustments in terms of the percentage of the portfolio that must be traded to restore equal weights.

Problem 2: Buying on Margin [20 points]

An investor recently opened a brokerage account with $400,000 of cash. They decide to purchase shares of NewCorp (NEWC). Prescribing to the philosophy of "go big or go home," the investor decides to utilize the full margin borrowing capacity available through their broker. The investor may borrow from their broker at 8% per year and must have an initial margin of at least 50%. The maintenance margin is 25%. The current market price of NEWC is $160.00.

a. [4] Assume the investor utilizes their maximum margin potential. How many shares of NEWC can the investor purchase?

b. [4] Below what stock price will the investor receive a margin call?

c. [4] If the investor holds this position for 3 months and then sells the shares and repays the loan, what is the percentage profit (loss) if the market price of NEWC is $210.00 after 3 months?

d. [4] If the investor holds this position for 3 months and then sells the shares and repays the loan, what is the percentage profit (loss) if the market price of NEWC is $110 after 3 months?

e. [4] Compare your answers in C. and D. to the profit (loss) if the investor did not use the margin account and instead only purchased $400,000 worth of NEWC shares. Discuss the effect of leverage on returns.

Problem 3: Equivalent Taxable Yields [8 points]

a. [4 points] Consider a tax exempt municipal bond with an annual yield of 2%. Find the equivalent taxable yield for investors with each of the following tax brackets: 0%; 15%; 25%, 35%.
a. [4 points] Fairfax County, a AAA-rated municipality, issued tax exempt municipal bonds that yield 1% and mature in 5 years. Otherwise identical corporate bonds that are AAA-rated and mature in 5 years but are taxable yield 1.4%. What is the implied tax rate?

Problem 4: Shareholders and corporate governance [4 points]

a. [2 points] How do shareholders affect corporate governance?
b. [2 points] Oversight by large institutional investors or creditors is one mechanism to reduce agency problems. Why don't individual investors in the firm have the same incentive to keep an eye on management?

Problem 5: Asset Allocation [6 points]

Target date funds (TDFs) are designed as total portfolio solutions, meaning an investor could conceivably allocate all of their investment portfolio to a single fund. There are many TDFs available in the marketplace today. The Target Date refers to an investor's expected retirement date. For example, the Vanguard Target Retirement 2020 fund is designed for investors anticipating retiring in or near year 2020.

a. [2 points] Review the information on Vanguard's website and determine the asset allocation in the 2020 fund:
https://investor.vanguard.com/mutual-funds/profile/overview/vtwnx
b. [2 points] Repeat part A for the 2050 fund:
https://investor.vanguard.com/mutual-funds/profile/overview/vfifx
c. [2 points] Do the asset allocations in a. and b. seem reasonable? If they differ between the two funds, do those differences seem appropriate?