f) We should invest in bonds with higher YTM because they give higher expected returns.

g) Bonds with higher coupon rates have more interest rate risk.

i) The market expects a rate cut in next month's Fed meeting, therefore I should load up on bonds to take advantage of the opportunity.

j) Optimal portfolios should exclude individual assets whose expected return and risk are dominated by other available assets.

k) As more securities are added to a portfolio, total risk would typically be expected to fall at a decreasing rate.

l) CAPM says that all risky asset must have positive risk premium.

m) If the rate of re-investment is higher than IRR then MIRR would be lower than IRR.

n) The ~~ex~~ expected return on an investment with a β of 2.0 is twice as high as the expected return on the market.

o) A perpetuity can be converted in to annuity.

p) Diversification always minimises risk.

c) Can the portfolios in the above question be ranked? Explain

d) Compute the expected return and standard deviation of asset D, which is formed by combining B and C with equal weights?

e) Combine A and C to form a portfolio, such that the standard deviation of this portfolio equals that of D. Find proper weights?

f) Are A, B and C efficiency portfolios? Explain

g) Construct an efficient portfolio from the asset A, B and C with an expected return of 10%. [1×7 = 07]

Q9) True or False? Briefly Explain. [01×15 = 15]

a) You can construct a portfolio with β of 0.75 by investing 0.75 of the investment buget in bills and remainder in the market portfolio.

b) If a stock lies below the SML, it is under valued.

c) By the CAPM, stocks with the same β have the same variance.

d) The average β of all the assets in the market is 1.

e) The capital asset pricing model assumes that all investors have the same information and are willing to hold the market portfolio.

Combining both, we get the answer.

4) Solution :->

Suppose that $c^a > c^e$

-> Sell the American call and buy a European call with same K, T and underlying asset.
Net cash flow $c^a - c^e$ would be invested.

-> If the owner of the American call choose to exercise the option, sell short a share of the security for K and add the proceeds to the amount invested.

-> At time T close out the short position in the security by exercising the european option.
We have

$$(c^a - c^e)e^{rT} + K[e^{r(T-t)} - 1] > 0$$

-> If the American option is not exercised, the european option can be allowed to expire with $[c^a - c^e]e^{rT} > 0$.

So, $\boxed{c^a = c^e}$

5) Solution → Using put-call parity twice,

So, $\text{call} - \text{put} = \text{Stock} - PV(K)$

$$\text{Call}_{50} = 94 - PV(50) + \text{Put}_{50}$$

$$\text{Call}_{60} = 94 - PV(60) + \text{Put}_{60}$$

6) Solution →

a) Suppose the statement is true. We need to replicate $\max[S_T - 210, 0]$ by choosing a static trading strategy consisting x_1 of C_{200} and x_2 of C_{220}.

$$x_1 \cdot C_{200} + x_2 \cdot C_{220} = C_{210}$$

Suppose $S_T = 205$, in this case C_{210} and C_{220} are worth zero and C_{200} is worth $5 = 205 - 200$

So,

$$x_1 \times 5 + x_2 \times 0 = 0 \Rightarrow x_1 = 0.$$

Now, $S_T = 215$; C_{210} worth $215 - 210$. The replicating portfolio has, however, zero value since $x_1 = 0$ and C_{220} is worth zero.

So, ~~$~~ it's not possible to find a static portfolio.

FMSG

FINANCIAL ECONOMICS :->

Q3) **Solution :->** Prove $S - K \le C - P \le S - Ke^{-rT}$

We can prove this inequality by dividing it into two separate inequalities.

First, $\boxed{C + K \ge S + P}$

Let us assume that $C + K < S + P$, we can prove the inequality by contradiction.

-> Sell the security, sell the put and buy call. This produces cash flow of $S + P - C$

-> Invest this at risk-free rate

-> If put exercised : $(S+P-C)e^{rT} - K > Ke^{rT} - K \ge 0$

-> If put not exercised : $(S+P-C)e^{rT} - K > Ke^{rT} - K > 0$

Thus, the investor receives non-negative profit, which violates the principal of no arbitrage.

Second, $\boxed{S + P \ge C + Ke^{-rT}}$

Let us assume $S + P < C + Ke^{-rT}$

-> Sell an American call and buy the security and the American put. Thus, $C - S - P$ is borrowed at $t = 0$.

-> If the owner of the call decides to exercise it at any time $0 < t \le T$, sell the security by exercise put for K. We have to pay the loan of $(C - S - P)e^{rT}$,

$(C-S-P)e^{rT} + K = (C + Ke^{-rT} - S - P)e^{rt} \ge (C + Ke^{-rT} - S - P)e$

Since $r > 0$. We have $S + P < C + Ke^{-rT}$ is positive.

FINANCIAL ECONOMICS TEST 1 (TOTAL MARKS- 20)

1. Why options have premium but futures are free of cost? Explain. **(2)**

2. Let X be the only asset traded in three state economy and X= $\begin{matrix}1\\2\\3\end{matrix}$ represents the price of X in three states of the world. You combine it with two call options with strike price 1 and 2. Does addition of option improves efficiency for you? Why or Why not? **(2)**

3. Prove for American options the following inequality will hold, where symbols have usual meaning: $\mathbf{S - K \leq C - P \leq S - Ke^{-rT}}$. **(3)**

4. We know that $C \geq c$. Prove $C=c$; if the underlying asset for both the asset is same non-dividend paying stock, with identical strike price and expiry time. **(3)**

5. Use the information to determine the unknown prices: - **(2)**

Security	Maturity	Strike Price	Prices
Stock	NA	NA	100
Put on stock	1	50	3
Put on stock	1	60	5
Call on stock	1	50	57.50
Call on stock	1	60	?
T-bill(FV=100)	1	NA	?

6. State whether the following statements are true or false. In each case provide brief explanation: - **(2+1)**
   a) An investor would like to purchase a European call option on an underlying stock index with a strike price of 210 and time to maturity of 3 moths, but this option is not actively traded. However, two otherwise identical call options are traded with strike price of 200 and 220 respectively; hence the investor can replicate a call with strike price of 210 by holding a static portfolio of two traded calls.
   b) By observing the prices of call and put options on a stock, one can recover an estimate of the expected stock return.

7. a) Why should we hedge a portfolio using stock index futures, when we get only the risk free rate of return with this strategy? **(1)**
   b) A position of \$X in risky asset A may hedge an exposure of \$Y in risky asset but position of \$Y in risky asset B may not hedge an exposure of \$X in asset A. True or False. Explain. **(1)**

8. Two futures contract with two and three months' maturity are traded on a financial asset without any intermediate payout. The price of these contracts are F_2= 100 and F_3= 101, respectively. **(0.5+1)**
   a) What is the spot price of the underlying asset today?
   b) Suppose that a one month futures contract is trading at price F_1= 98. Does this imply an arbitrage opportunity?

9. Explain the significance of Box Spread, using profit diagram and pay-off table. How will you price a box spread? **(1.5)**