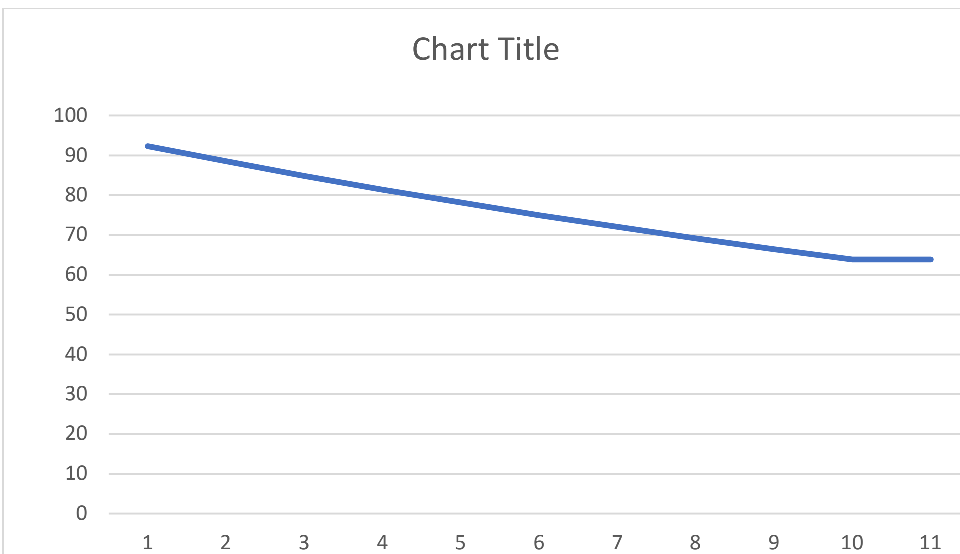
QUESTION 1

time t (annual)	Cash flow (CF) at time t	Present discounted CFs at year 0	Bond price P_t(10)
0	0	0	92.27826507
1	4	3.80952381	88.46874126
2	4	3.628117914	84.84062335
3	4	3.455350394	81.38527295
4	4	3.290809899	78.09446305
5	4	3.134104666	74.96035839
6	4	2.984861587	71.9754968
7	4	2.842725321	69.13277148
8	4	2.707357448	66.42541403
9	4	2.578435665	63.84697837
10	104	63.84697837	63.84697837

coupon rate	0.04
yield	0.05
Discount Factor	0.951229425

QUESTION 1 – PART 3



QUESTION 1 – PART 4

If there's a positive chance of not receiving the cash flows (i.e., default risk), the bond's price would be impacted negatively. Investors would demand a higher yield to compensate for the risk of not receiving some or all of the promised cash flows. Consequently, the bond's yield curve would likely shift upwards, leading to a decrease in bond prices across various maturities. This shift would reflect the increased required return to compensate for the additional risk. Essentially, bonds with higher default risk would trade at lower prices relative to bonds with similar characteristics but lower default risk.

Questions	Answer
1. Bond Price at 0	92.27826507
2. Bond Price at 5	74.96035839
3. Plot	attach to form
4. Discussion	post on form

Question 2 - Part 3

- Stock price (S) = $400
- Strike price (K) = $450
- Risk-free interest rate (r) = 5% (as a decimal, r = 0.05)
- Volatility (σ) = 0.134
- Time to expiration (T) = 9 months (we need to convert this to years)

Since the Black-Scholes model works with annualized volatility and time, we need to convert the 9-month expiry to years:

T = 9 months / 12 months/year = 0.75 years

Black-Scholes formula for a European call option :

C = N(d1) * S - N(d2) * Ke^(-rT)

where:

- C is the call option price
- N(d1) and N(d2) are cumulative distribution functions of the standard normal distribution
- d1 and d2 are calculated using the other input parameters

d1 = (ln(S/K) + (r + σ^2/2) * T) / (σ * sqrt(T))

d1 = (ln(400/450) + (0.05 + 0.134^2/2) * 0.75) / (0.134 * sqrt(0.75))

d1 = -0.628

d2 = d1 – σ*sqrt(0.75)

d2 = -0.745

N(d1) = NORMDIST(d1, mean, standard_dev, cumulative)

N(d2) = NORMDIST(d2, mean, standard_dev, cumulative)

Where,

- Mean = 0
- Std deviation = 1
- Cumulative = TRUE

C = 7.104

QUESTION 2

Question #	Answer
1. Annual Volatility	0.134982329
2. Annual Mean Return	0.054308552
3. Option Price	7.104807395
4. Estimated Option Price	10.11284789
5. 95% VaR (Long)	58.03194733
6. 95% VaR (Short)	72.82377876
7. 95% Var (Combined)	96.02484109
8. KI Barrier Option Price	65.81143322
9. Difference BW 8 and 4	55.69858533

Question 2 – PART 9

European Call (10.11): This option offers the right, but not the obligation, to buy the stock at a certain price (strike price) by expiration. It provides a guaranteed payout if the stock price is above the strike price at expiration.

Knock-In Call (65.8): This option is similar, but with an added layer of risk. It only becomes active (like a regular European Call) if the stock price reaches a specific barrier level (U) before expiration. If the price never reaches the barrier, the Knock-In Call expires worthless.

Because of this additional risk, the Knock-In Call option is priced lower to compensate for the possibility that it might not pay out anything. The difference of 55.69 reflects the market's pricing for this extra risk.

In essence, you pay a premium for the guaranteed potential profit of the European Call compared to the lower price but uncertain payoff of the Knock-In Call.

MCQ :

Question Number	Answer Choice
1	b
2	b
3	b
4	c
5	b
6	d
7	c
8	c
9	c
10	b
11	d
12	b
13	b
14	b
15	a
16	b
17	d
18	c
19	c
20	b
21	a
22	b
23	c
24	c
25	a
26	c
27 (BONUS)	a