

Academic year 2022/2023

 Exam – 26th June 2023

15:30 (Lisbon Time)

Duration: 1:45 h

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Important notes

1. The correct answers should be written ONLY IN the TABLE below, with a full circle, NOT along the pages.
2. Use a pencil for your answers in the TABLE and only in the end, fill it with a pen.
3. Do not separate the set of sheets of this handout, they should be delivered all.
4. The test is to be done without consultation. Any cheating will cancel the test.
5. Each multiple-choice question is worth **0.625** values; each wrong answer discounts **0.125** values on the exam grade; an unanswered question will have **0**. Answering several options is a wrong answer.
6. Only basic or scientific calculators (without text storage) are allowed but you have a formula summary at the end of this assignment.

COMPULSORY ANSWERS TABLE

Questions	Answers: fill with a circle					Questions	Answers: fill with a circle			
1	a	b	c	d	e	17	a	b	c	d
2	a	b	c	d	e	18	a	b	c	d
3	a	b	c	d	e	19	a	b	c	d
4	a	b	c	d	e	20	a	b	c	d
5	a	b	c	d	e	21	a	b	c	d
6	a	b	c	d	e	22	a	b	c	d
7	a	b	c	d	e	23	a	b	c	d
8	a	b	c	d	e	24	a	b	c	d
9	a	b	c	d	e	25	a	b	c	d
10	a	b	c	d	e	26	a	b	c	d
11	a	b	c	d	e	27	a	b	c	d
12	a	b	c	d	e	28	a	b	c	d
13	a	b	c	d	e	29	a	b	c	d
14	a	b	c	d	e	30	a	b	c	d
15	a	b	c	d	e	31	a	b	c	d
16	a	b	c	d	e	32	a	b	c	d

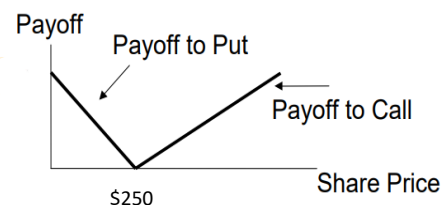
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1. The CAPM theory predicts that a security with a beta of one:
 - a) will offer zero expected return.
 - b) will offer the risk-free rate of return.
 - c) will offer the risk of the market.
 - d) will offer the risk of a stock.
 - e) No one of the others.

2. A portfolio has an average return of €5 million and a returns' variance of €4 million. What is the Value at Risk for this portfolio with a significance of 1% (VaR_{1%})? Use the Normal table in the last page to find the needed probability.
 - a) -4.32
 - b) -1.56
 - c) 0.34
 - d) 1.72
 - e) No one of the others

3. Your guess is that the share prices of Microsoft corporation will be quite volatile around the current \$250 in the next quarter, being quite low or quite above that value, not close. You are prepared to build an options strategy to profit from that. What type of strategy should you follow?
 - a) Sell one put and buy one call with an exercise price of \$250
 - b) Buy one call and buy one put, both with an exercise price of \$250
 - c) Sell one call and buy one put with an exercise price of \$250
 - d) Sell one call and buy one put with an exercise price of \$250
 - e) No one of the others



4. The "Risk appetite" setting should be defined at which step of the COSO Risk Components:
 - a) Objective setting
 - b) Internal Environment
 - c) Event Identification
 - d) Risk Assessment
 - e) Risk response

5. You have a Portfolio constituted by 20% of Tesla shares and 80% of Ford shares, and the shares have the Standard Deviation respectively of 4% and 6%, having a correlation of -0.2 (negative). The portfolio Standard deviation is:

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- a) Between 0.05 and 0.06
- b) Between 0.04 and 0.05**
- c) Between 0.03 and 0.04
- d) Between 0.02 and 0.03
- e) No one of the others

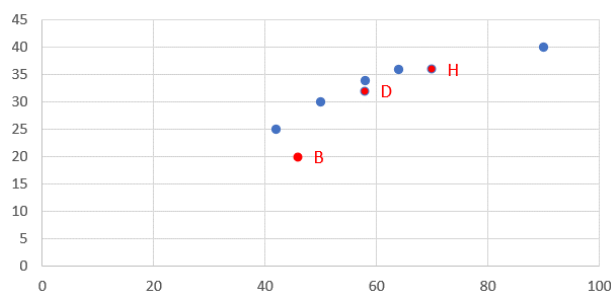
6. Four hedge funds (A, B, C, D) presented the yearly results of their portfolios, being respectively for the Average Return: 3%, 5%, 1%, 4% and the Beta portfolio's being respectively 0.9, 1.2, 0.7, 1.1. Using the appropriate portfolio risk measure, to find the best performing Hedge fund in terms of return premium? Assume a risk-free rate of 0.5%.

- a) A
- b) B**
- c) C
- d) D
- e) Not enough information to decide.

7. Consider the following portfolios generated with Monte Carlo simulation and choose the ones that do not belong to the efficient frontier (are dominated):

Portfolios:	A	B	C	D	E	F	G	H
Expected return, r , (%):	25	20	30	32	34	36	40	36
Standard deviation (σ), (%):	42	46	50	58	58	64	90	70

- a) A, C, F
- b) D, F, H
- c) D, F, G
- d) B, D, H**
- e) No one of the others

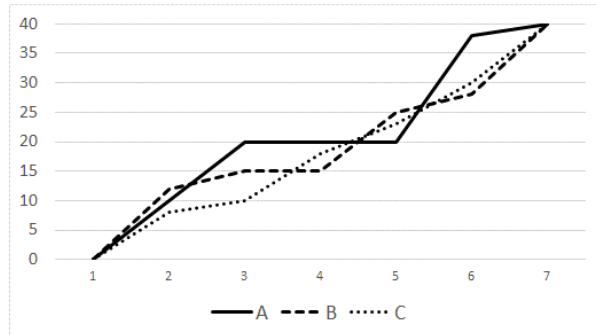


8. Cumulative probability distributions obtained with Monte Carlo simulation for three possible alternative strategies (A, B and C) to be chosen by a company are presented in the figure below. Which of the following statements is correct:

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- a) The A strategy has second order dominance over strategy B
- b) The B strategy has second order dominance over strategy A
- c) The C strategy has first order dominance over strategy B
- d) The B strategy has second order dominance over strategy C
- e) no one of the above



9. What is the Beta of Berkshire Hathaway shares, knowing that the respective average shares return is 12%, the Nasdaq Index presented an average return of 8% and the risk-free rate is 4%?
- a) 0.5
 - b) 0.75
 - c) $2 R: (12-4)/(8-4)$
 - d) 3
 - e) No one of the others
10. The covariance between Johnson & Johnson stock and Nasdaq index is 6 and the standard deviation of Nasdaq index is 2. What is the Beta of IBM Stock?
- a) 0.33
 - b) 0.67
 - c) 1.5
 - d) 3
 - e) No answer is correct.
11. The measure on how fat are the extreme points of a random variable can be achieved using the value of:
- a) Standard Deviation
 - b) Mean
 - c) Kurtosis
 - d) Skewness
 - e) No one of the others
12. Each Amazon share is presently valued at \$1000. Assuming an exercise price of \$800, a share's six-month volatility of 30% and a six-month risk-free interest rate of 2.5%, calculate the value of a Call option at three months maturity.
- a) Between \$215 and \$220

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- b) Between \$220 and \$225 R=222.2
- c) Between \$225 and \$230
- d) Between \$230 and \$235
- e) No one of the others
13. The General Motors share price is \$36 while a Starbucks Put Option with a maturity of 3 months is valued at \$6 with an exercise price of \$32. The risk-free interest rate is 5% per semester. How much would you be willing to pay for a Call Option on General Motors shares with the same maturity and exercise price? Assume European options.
- a) Between 9 and 10
- b) Between 10 and 11 R:10.8
- c) Between 11 and 12
- d) Between 12 and 13:5.39
- e) No one of the others
14. The current spot Aluminum price is \$2200 per ton and the Future price six-months from now is \$2000. Assuming a 4% yearly free interest rate and a one-year storage cost of \$20 per ton, the convenience yield for six-months is:
- a) -10.1%
- b) 11.6%
- c) -11.6%
- d) -13.6%
- e) No one of the others
15. A company issued a one-year bond, which pays 6% yearly interest with coupons paid each semester. The bond has a face value of \$1000. The market value of the bond today is \$800. What is the bond buyer's return at the end of six months (YTM), if the company will not default?
- a) 15.2%
- b) 17.6%
- c) 17.9%
- d) 18.5%
- e) No one of the others
16. A farmer is concerned about short-term volatility in its revenues. Corn currently sells for \$600 a ton but will fall to \$500 at the end of next quarter. Which will be the total revenues if the firm:
- i) remains unhedged
- ii) enters a one-quarter futures contracts with a future price of \$600
- iii) buys a one-quarter put option for \$50 per ton to sell corn for \$700 per ton next quarter
- a) i)\$500 ii)\$600 iii) \$650
- b) i)\$500 ii)\$600 iii) \$150

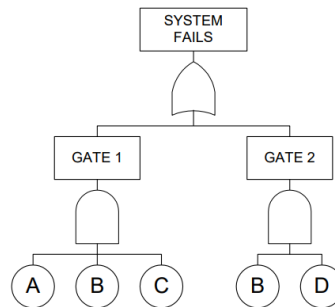
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- c) i) \$600 ii) \$600 iii) \$150
- d) i) \$500 ii) \$600 iii) \$200
- e) No answer is correct.

17. For the following Fault Tree Analysis, which one is a minimal “cut-set”?

- a) **BD**
- b) AB
- c) AC
- d) AD
- e) No one of the others



18. Event Tree Analysis (ETA) is a systematic technique used in risk assessment and decision analysis. Select the statement below that accurately describes Event Tree Analysis.

- a) Event Tree Analysis is a backward-looking technique that focuses on analyzing the causes and consequences of past events.
- b) **Event Tree Analysis helps in understanding the likelihood and consequences of different outcomes resulting from an initiating event.**
- c) Event Tree Analysis is a qualitative technique that does not require numerical data or probability estimates.
- d) Event Tree Analysis is primarily used in financial forecasting and investment analysis.
- e) All the answers are correct

19. In the FMECA technique, identify which sentence does not belong to the “Act” phase:

- a) What can be done?
- b) How can we eliminate the causes?
- c) How can we reduce the severity?
- d) **What can go wrong?**
- e) All belong to the “Act” phase.

20. The IBM share price is \$25 while a IBM Put Option with a maturity of 3 months is valued at \$5 with an exercise price of \$20. The risk-free interest rate is 5% per year. How much would you be willing to pay for a Call Option on IBM shares with the same maturity and exercise price? Assume European options.

- a) Between 9.5 and 10
- b) **Between 10 and 10.55+25-20/1.05^0.25**
- c) Between 10.5 and 11
- d) Between 11 and 11.5

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- e) No one of the others
21. Which expression is correct for the value of a Call Option?
- a) Call option = $\max [0 ; (\text{stock price} - \text{exercise price})] - \text{premium}$
 - b) Call option = $\min [0 ; (\text{exercise price} - \text{stock price})] - \text{premium}$
 - c) Call option = $\min [0 ; (\text{stock price} - \text{exercise price})] - \text{premium}$
 - d) Call option = $\max [0 ; (\text{exercise price} - \text{stock price})] - \text{premium}$
 - e) No one is correct
22. The @Risk function used to calculate the Value at Risk:
- a) @risktarget
 - b) @riskpercentile
 - c) @risksimtable
 - d) @riskcompound
 - e) @riskdiscrete
23. The @Risk function used to calculate the probability of a variable being less than a given value is:
- a) @riskbernoulli
 - b) @riskpercentile
 - c) @risksimtable
 - d) @risktarget
 - e) @riskdiscrete
24. You have bought a Put option on a Visa share for \$40, with a strike price of \$200. If at maturity the share is worth \$180, how much you will be your payout?
- a) -\$60
 - b) -\$20
 - c) +\$20
 - d) +\$60
 - e) No answer is correct.
25. The copper futures price for six-month contract is \$5 per Kg and the spot price is \$4 per Kg. The yearly Convenience Yield is -7%, the yearly interest rate is 5%. Calculate the storage costs in \$/Kg in six-month time.
- a) 0.52 \$/Kg
 - b) 1.1 \$/Kg
 - c) $1.8 \text{ \$/Kg} = [(5/4)^2 - 1 - 0.5 - 0.07] = 0.4425 * 4 = 1.8$
 - d) 2.3 \$/Kg

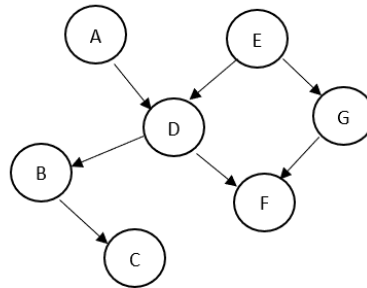
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- e) No one of the others
26. PayPal company has issued one-year bonds with 5% coupons and with a nominal value of \$1000. Suppose, however, that there is a 30% chance that PayPal will default after one year, and in that case the bond holders will receive 50% of the bonds nominal value. The interest rate on one-year risk-free bonds is 5%. How much would it cost you to insure the bonds of PayPal company against default?
- a) 142
b) 154
c) $165 = (1000+50)*0.7+0.5*1000*.3=885/1.05=842.9; 1050/842.9=1.246-1=0.246-0.05=0.196*842.9=165$
d) 173
e) No one of the answers
27. If the strike (or exercise) price increases, the respective:
- a) Call price increases and the Put prices increases.
b) Call price increases and the Put prices decreases.
c) Call price decreases and the Put prices increases.
d) Call price decreases and the Put prices decreases.
e) No one is correct.
28. A put option is in the money (ITM) if the:
- a) market price is above the strike price.
b) market price is below the strike price.
c) market price is equal to the strike price.
d) call option has a larger value than the put option.
e) call option has a smaller value than the put option.
29. Which equation reflects the Put-Call parity?
- a) Put Price - Call price = Present Value of the Exercise price – Stock price
b) Put Price + Call price = Present Value of the Exercise price – Stock price
c) Put Price + Call price = Present Value of the Exercise price + Stock price
d) Put Price - Call price = Present Value of the Exercise price + Stock price
e) No one is correct
30. Which nodes are conditionally dependent on A (or d-connected) and knowing nothing about the remaining nodes?

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- a) D, E, F, G
- b) A, D, B, C, F
- c) A, D, B, C
- d) E, G, F
- e) No one of the answers

31. If the Convenience Yield for a commodity is positive, this means that:

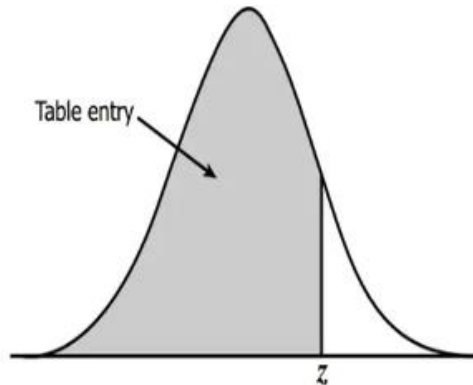
- a) The cost of storing and holding the commodity is higher than the benefits or convenience gained from consuming it.
- b) There is a lower demand for the commodity due to factors such as scarcity or decreased utility.
- c) The market perceives the commodity as having a lower value in the present compared to the future.
- d) All are correct.
- e) All are wrong.

32. The XPTO Company Debt has a one-year maturity and the promised payment to White Stone creditors is \$2,200. The market value of the Assets is \$2,500 and the standard deviation of Asset value is 20% per quarter. The risk-free Interest rate is 5%. Calculate the stock value of White Stone.

- a) Between \$450-\$600
- b) Between \$600-750\$ P=2500, Ex=2200, D1=0.65, D2=0.25, C=602;
- c) Between \$750-900\$
- d) Between \$900-1050\$
- e) No answer is correct.

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Find values on the right of the mean in this z-table. Table entries for z represent the area under the bell curve to the left of z. Positive scores in the Z-table correspond to the values which are greater than the mean.

z	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
0.0	.5000	.5040	.5080	.5120	.5160	.5199	.5239	.5279	.5319	.5359
0.1	.5398	.5438	.5478	.5517	.5557	.5596	.5636	.5675	.5714	.5753
0.2	.5793	.5832	.5871	.5910	.5948	.5987	.6026	.6064	.6103	.6141
0.3	.6179	.6217	.6255	.6293	.6331	.6368	.6406	.6443	.6480	.6517
0.4	.6554	.6591	.6628	.6664	.6700	.6736	.6772	.6808	.6844	.6879
0.5	.6915	.6950	.6985	.7019	.7054	.7088	.7123	.7157	.7190	.7224
0.6	.7257	.7291	.7324	.7357	.7389	.7422	.7454	.7486	.7517	.7549
0.7	.7580	.7611	.7642	.7673	.7704	.7734	.7764	.7794	.7823	.7852
0.8	.7881	.7910	.7939	.7967	.7995	.8023	.8051	.8078	.8106	.8133
0.9	.8159	.8186	.8212	.8238	.8264	.8289	.8315	.8340	.8365	.8389
1.0	.8413	.8438	.8461	.8485	.8508	.8531	.8554	.8577	.8599	.8621
1.1	.8643	.8665	.8686	.8708	.8729	.8749	.8770	.8790	.8810	.8830
1.2	.8849	.8869	.8888	.8907	.8925	.8944	.8962	.8980	.8997	.9015
1.3	.9032	.9049	.9066	.9082	.9099	.9115	.9131	.9147	.9162	.9177
1.4	.9192	.9207	.9222	.9236	.9251	.9265	.9279	.9292	.9306	.9319
1.5	.9332	.9345	.9357	.9370	.9382	.9394	.9406	.9418	.9429	.9441
1.6	.9452	.9463	.9474	.9484	.9495	.9505	.9515	.9525	.9535	.9545
1.7	.9554	.9564	.9573	.9582	.9591	.9599	.9608	.9616	.9625	.9633
1.8	.9641	.9649	.9656	.9664	.9671	.9678	.9686	.9693	.9699	.9706
1.9	.9713	.9719	.9726	.9732	.9738	.9744	.9750	.9756	.9761	.9767
2.0	.9772	.9778	.9783	.9788	.9793	.9798	.9803	.9808	.9812	.9817
2.1	.9821	.9826	.9830	.9834	.9838	.9842	.9846	.9850	.9854	.9857
2.2	.9861	.9864	.9868	.9871	.9875	.9878	.9881	.9884	.9887	.9890
2.3	.9893	.9896	.9898	.9901	.9904	.9906	.9909	.9911	.9913	.9916
2.4	.9918	.9920	.9922	.9925	.9927	.9929	.9931	.9932	.9934	.9936
2.5	.9938	.9940	.9941	.9943	.9945	.9946	.9948	.9949	.9951	.9952
2.6	.9953	.9955	.9956	.9957	.9959	.9960	.9961	.9962	.9963	.9964
2.7	.9965	.9966	.9967	.9968	.9969	.9970	.9971	.9972	.9973	.9974
2.8	.9974	.9975	.9976	.9977	.9977	.9978	.9979	.9979	.9980	.9981
2.9	.9981	.9982	.9982	.9983	.9984	.9984	.9985	.9985	.9986	.9986
3.0	.9987	.9987	.9987	.9988	.9988	.9989	.9989	.9989	.9990	.9990
3.1	.9990	.9991	.9991	.9991	.9992	.9992	.9992	.9992	.9993	.9993
3.2	.9993	.9993	.9994	.9994	.9994	.9994	.9994	.9995	.9995	.9995
3.3	.9995	.9995	.9995	.9996	.9996	.9996	.9996	.9996	.9996	.9997
3.4	.9997	.9997	.9997	.9997	.9997	.9997	.9997	.9997	.9997	.9998

Black-Scholes Option Pricing Model:

$$O_C = [N(d_1) \times P] - [N(d_2) \times PV(EX)]$$

$$d_1 = \frac{\ln\left(\frac{P}{EX}\right) + \left(r + \frac{v^2}{2}\right)t}{v\sqrt{t}} \quad d_2 = d_1 - v\sqrt{t}$$

$$\text{Put price} = O_C + PV(EX) - P$$

$$F_t = S_0(1 + r_f - y)^t \quad F_t = S_0(1 + r_f + SC - CY)^t \quad \text{Treynor Ratio} = \frac{r_p - r_f}{\beta_p}$$