

ADMISSION TEST

Master in Finance - University of Pavia

September 11, 2025

Family name	
First name	

The duration of the test is **90 minutes**.

To pass the test you must answer correctly **at least 5** questions for each section.

Calculators are not needed; laptops, tablets, cell-phones and any other electronic devices are not allowed.

You can start in the next page. Leave the following lines blank.

1	2	3	

Economics

- 1) If a government raises tariffs on imported cars and on imported inputs for the domestic automotive industry, the stock market valuation of domestic car producers:
- A goes up.
 - B falls.
 - C might go either way.
- 2) The valuation of a financial asset is based on determining:
- A the present value of future cash flows.
 - B the current yield to maturity on long term corporate bonds of the issuer.
 - C what the corporation is paying to attract preferred shareholders.
- 3) The efficient frontier for financial investments represents:
- A the difference between investment returns.
 - B the lowest risk for any given portfolio expected return.
 - C the correlation between profits and the portfolio effect.
- 4) Which of the following is a firm-specific risk factor?
- A Market portfolio risk
 - B Interest rate risk
 - C Financial risk
- 5) To say that there is "asymmetric information" in the issuing of stock or debt means that
- A investors are suspicious of managers objectives and behave accordingly.
 - B investors are unlikely to provide requested financial support.
 - C management has hidden profits if the issuance of stock or debt succeeds.
- 6) Central Bank independence is crucial to
- A limit expansionary/electoral monetary policies in bad times.
 - B reduce real rates in the long run.
 - C limit political cycles in monetary policy.
- 7) Commercial banks supervision is meant to:
- A improve the performance of commercial banks.
 - B induce the selection of better bank managers.
 - C prevent too-big-to-fail issues.
- 8) The international financial market is efficient. You live in the Euro area. At time t you borrow in dollars and invest in euros. If, at maturity, the euro depreciates, as expected, over the dollar:
- A the interest rate gap between the FED and the ECB compensates the exchange rate movement.
 - B you lose more or gain less.
 - C you lose less or gain more.
- 9) The major benefit of diversification is:
- A to avoid unnecessary portfolio risk.
 - B to gain additional expected returns.
 - C to improve the expected combination of risk and return.
- 10) The optimal central bank policy should
- A immediately react to shocks to keep inflation on target all the time.
 - B anchor long-term expectations.
 - C supervise the financial stability of commercial and investment banks.

Mathematics for Economics and Finance

11) The linear system

$$\begin{cases} x_1 - x_2 + x_3 = 4 \\ 2x_1 + 4x_3 = 4 \\ x_1 + 2x_2 + 4x_3 = -2 \end{cases}$$

- A has no solutions.
 B has 1 solution.
 C has 2 solutions.
 D has infinite solutions.

12) Consider the real function $f : (0, +\infty) \rightarrow \mathbb{R}$, defined as

$$f(x) = x^2(1 + 2x^{-3}).$$

Compute $f'(1) + f''(1)$.

- A -12
 B -2
 C 6
 D 12

13) Consider a real function f defined on a bounded open interval \mathcal{I} . Select the true answer.

- A if f is integrable in \mathcal{I} , then f is differentiable in \mathcal{I}
 B if f is invertible in \mathcal{I} , then f is monotone in \mathcal{I}
 C if f is strictly decreasing in \mathcal{I} , then f has a minimum in \mathcal{I}
 D if f is bounded and differentiable in \mathcal{I} , then f is integrable in \mathcal{I}

14) Compute $\lim_{x \rightarrow 0} x^{-1}(e^{-4x} - 1)$.

- A -4
 B 4
 C -1/4
 D 1/4

15) Compute $\int_0^{\pi/2} \sin(2x) dx$.

- A -1
 B 0
 C 1
 D 2

16) The determinant of the matrix $\mathbf{M} = \begin{bmatrix} -1 & 4 & -3 \\ 0 & 1 & -1 \\ 3 & 1 & -4 \end{bmatrix}$ is

- A -6
 B 0
 C 9
 D none of the above

17) The market price of a zero coupon bond, 3 years to maturity, and face value 100, is 91.15. What is the implied 3-year spot rate (on annual basis)?

- A $\approx 2.58\%$
 B $\approx 1.90\%$
 C $\approx 3.14\%$
 D none of the previous answers

18) On the risk-free market, the 1-year and 2-year spot rates are 1% and 3%, respectively (on annual basis). Find the market value of a coupon bond, 2 years to maturity, paying 3 EUR at the end of each year, and face value 100 EUR.

- A ≈ 97.456 EUR
 B ≈ 100.058 EUR
 C ≈ 102.170 EUR
 D none of the previous answers

19) The value of a financial assets, recorded the first trading day of January, was $V(2021) = 1545.00$ EUR at the beginning of 2021, $V(2023) = 1671.07$ EUR at the beginning of 2023, $V(2025) = 1807.43$ EUR at the beginning of 2025. Let r_t be the compound rate of return, on annual basis, during the year t , so that $V(t+1) = V(t)(1+r_t)$. Which sentence is not consistent with these values?

- A The compound rate of return was 4.00% on annual basis, and constant through the whole time period.
 B The compound rate of return was variable, but always larger than 4.10% on annual basis, during the whole time period.
 C The compound rate of return was variable, but always lower than 4.10% on annual basis, during the whole time period.
 D The compound rate of return was variable, The compound rate of return during the third year was larger than the rate of return during the fourth year.

20) Consider the annuity composed by a stream of 9 constant and deterministic cash flows of 750 EUR, at the end of each year starting from the date 2 onwards (let today be the date 0). Compute the present value of this annuity, using 3% as annual compound interest rate.

- A ≈ 5164.00 EUR
 B ≈ 5669.50 EUR
 C ≈ 7142.90 EUR
 D none of the previous answers

Probability and Statistics

21) We flip a coin 3 times.

What is probability to get always HEAD?

- A = 50% (equivalently $\frac{1}{2}$)
- B \simeq 33.3% (equivalently $\frac{1}{3}$)
- C = 25% (equivalently $\frac{1}{4}$)
- D = 12.5% (equivalently $\frac{1}{8}$)

22) Consider a binomial random variable $\text{Bin}(8, 0.2)$. Its mean (called also mathematical expectation or expected value) equals

- A 0.2
- B 1.6
- C 8
- D 8.2

23) Which of the following sets of scores has mean 0?

- A 9, 9, 9, 9, 9, 9
- B 0, 2, 4, 6, 8, 10
- C -5, -4, -1, 2, 3, 5
- D -5, -3, -1, 2, 3, 5

24) Let X be a normal random variable $\mathcal{N}(3, 2)$ (i.e., 3 is the expected value and 2 is the variance). Then the distribution of $-X$ is

- A $\mathcal{N}(-3, -2)$
- B $\mathcal{N}(-3, 2)$
- C $\mathcal{N}(3, -2)$
- D none of the previous answers

25) In a class of 50 students, 30 like math, 20 like science, and 10 like both. What is the probability that a student likes science given that the student likes math?

- A $\frac{1}{5}$ (equivalently = 20%)
- B $\frac{2}{5}$ (equivalently = 40%)
- C $\frac{1}{3}$ (equivalently \simeq 33.3%)
- D $\frac{3}{10}$ (equivalently = 30%)

26) An urn contains 7 black, 6 white, 4 red and 3 green balls. We draw one ball at random.

Find the probability to be green.

- A 15%
- B 30%
- C 3%
- D none of the proposed answers

27) Given a normal random variable X of mean μ and variance σ^2 , we obtain a standard normal random variable (mean 0 and variance 1) by considering

- A $\frac{X - \mu}{\sigma}$
- B $\frac{X - \mu}{\sigma^2}$
- C $\frac{(X - \mu)^2}{\sigma^2}$
- D none of the previous answers

28) We draw a card from a deck of 52 cards. What is the probability of getting a heart card?

- A 0
- B $\frac{1}{4}$ (equivalently = 25%)
- C $\frac{1}{13}$ (equivalently \simeq 8%)
- D $\frac{1}{52}$ (equivalently \simeq 2%)

29) What does it mean that a data set has a standard deviation 0?

- A All data points are different.
- B The mean is zero.
- C All data points are the same.
- D The data is normally distributed.

30) Suppose two events A and B are independent. If

$$\mathbb{P}(A) = 0.7 \quad \mathbb{P}(B) = 0.2$$

then

- A $\mathbb{P}(A \cap B) = 0.9$
- B $\mathbb{P}(A \cap B) = 0.5$
- C $\mathbb{P}(A \cap B) = 0.14$
- D $\mathbb{P}(A \cap B) = 1.4$