

دفترچه شماره ۱۵

صبح چهارشنبه

۸۵/۱۲/۹

اگر دانشگاه اصلاح شود مملکت اصلاح می شود.  
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جمهوری اسلامی ایران  
وزارت علوم، تحقیقات و فناوری  
سازمان سنجش آموزش کشور

## آزمون ورودی

### دوره های کارشناسی ارشد ناپیوسته داخل

### سال ۱۳۸۶

مجموعه آمار

۱- آمار ریاضی

۲- آمار بیمه «اکچواری»

۳- آمار اقتصادی و اجتماعی

(کد ۱۲۰۷)

شماره داوطلبی:

نام و نام خانوادگی داوطلب:

مدت پاسخگویی: ۶۰ دقیقه

تعداد سؤال: ۶۰

مواد امتحانی رشته مجموعه آمار ۱- آمار ریاضی ۲- آمار بیمه «اکچواری» ۳- آمار اقتصادی و اجتماعی، تعداد و شماره سؤالات

ردیف	مواد امتحانی	تعداد سؤال	از شماره	تا شماره
۱	زبان عمومی و تخصصی	۳۰	۱	۳۰
۲	ریاضی (ریاضی عمومی - آنالیز ریاضی ۱)	۳۰	۳۱	۶۰

اسفند ماه سال ۱۳۸۵

استفاده از ماشین حساب مجاز نمی باشد.

**Part A: Vocabulary and Grammar**

*Directions: Choose the number of the answer (1), (2), (3), or (4) that best completes the sentence. Then mark your choice on your answer sheet.*

- 1- Symptoms of the illness include a high temperature and a(n) ----- dry cough.  
1) effective                      2) persistent                      3) respected                      4) considerate
- 2- You can protect the floor with ----- sheets of newspaper if you want to paint the walls.  
1) mediating                      2) restricting                      3) overlapping                      4) approaching
- 3- Modern examples of this type of weaving for Persian carpets in the region show little ----- from traditional patterns.  
1) deviation                      2) relevance                      3) application                      4) permanence
- 4- The road ----- the highway a mile from here – you can't miss the signs for it.  
1) intersects                      2) interferes                      3) intervenes                      4) intercepts
- 5- The love and support of his family ----- him during his time in prison and made him feel less desperate there.  
1) resolved                      2) sustained                      3) assumed                      4) determined
- 6- Anita had a(n) ----- arrangement with her brother – each would take care of the other's children if the need arose.  
1) adjacent                      2) coherent                      3) analogous                      4) reciprocal
- 7- Despite some doubts by the experts, the ----- of this painting to Rembrandt had never been questioned.  
1) attribution                      2) simulation                      3) association                      4) specification
- 8- You had better not ----- the car unlocked in this area – not even for a minute.  
1) left                      2) leave                      3) to leave                      4) leaving
- 9- He is studying mathematics so as ----- for higher salary.  
1) to qualify                      2) qualifying                      3) qualification                      4) he qualifies
- 10- No sooner had he drunk the coffee ----- he began to feel drowsy.  
1) that                      2) when                      3) than                      4) which

**Part B: Cloze Test**

*Directions: Read the following passage and decide which choice (1), (2), (3), or (4) best fits each blank. Then mark your choice on your answer sheet.*

A person with poor self-esteem (11) ----- a major struggle in work and relationships with other people. If you put (12) ----- value in yourself, others will not value you, (13) ----- want to be with you. For if you are self-centred and don't have any real concern for (14) -----, you will be, in fact, harmful to your community. And if a person has positive feelings (15) ----- himself they need to be balanced by a concern for other people.

- |                      |                  |                  |                  |
|----------------------|------------------|------------------|------------------|
| 11- 1) facing        | 2) faces         | 3) is faced      | 4) that faces    |
| 12- 1) some          | 2) a little      | 3) little        | 4) a great deal  |
| 13- 1) or won't they | 2) nor they will | 3) or they won't | 4) nor will they |
| 14- 1) the others    | 2) other's       | 3) others        | 4) the others'   |
| 15- 1) of            | 2) by            | 3) with          | 4) about         |

### Part C. Reading Comprehension

**Directions:** Read the following three passages and answer the questions by choosing the best choice (1), (2), (3), or (4). Then mark the correct choice on your answer sheet.

A commonly used example in any introductory probability and/or statistics course pertains to finding the exact distribution for the sum of two independent fair six-sided dice. Typically, the solution to this problem is obtained via sample space arguments. Once the distribution has been found, then students are often asked to calculate various probabilities and characteristics (e.g. mean and variance) associated with the sum. For instance, calculating the mean and mode of the distribution often gives students a much deeper understanding as to why the number 7 is everybody's lucky number.

Inevitably, there is at least one student who inquires about the fairness assumption of the dice. Certainly, it is not difficult to calculate the exact distribution of the sum when one or both of the dice are biased. However, it does require a little more effort as it is no longer as simple as counting simple events and dividing by the size of the sample space. Another extension of the experiment that is sometimes encountered is the case of three (or even more) dice.

It is these extensions that spawned the ideas which led to this article. For instance, it would be nice, from a teaching perspective, to be able to quickly calculate these distributions. This would free up valuable class time for discussions and perhaps other generalizations. In addition, some kind of "distribution calculator" tool that would allow students to explore these questions on their own would be beneficial.

- 16- The exact distribution of the sum of two biased dice requires -----.
- 1) more counting      2) more effort      3) less thinking      4) more integration
- 17- The phrase "spawned the ideas" in paragraph 3 means ----- the ideas.
- 1) remove      2) forget      3) change      4) give rise to
- 18- A calculator to be used to handle the problem referred to in paragraph 3 is -----.
- 1) harmful      2) useless      3) useful      4) misleading
- 19- The author implies that people's attitude towards number 7 is -----.
- 1) problematic      2) favorable      3) necessary      4) unclear
- 20- The word "encountered" in paragraph 2 means -----.
- 1) enumerated      2) felt      3) met      4) followed

The first known example of an opinion poll was a local straw vote conducted by The Harrisburg Pennsylvanian in 1824, showing Andrew Jackson leading John Quincy Adams by 335 votes to 169 in the contest for the United States Presidency. Such straw votes—unweighted and unscientific—gradually became more popular; but they remained local, usually city-wide phenomena. In 1916, the *Literary Digest* embarked on a national survey (partly as a circulation-raising exercise) and correctly predicted Woodrow Wilson's election as President. Mailing out millions of postcards and simply counting the returns, the *Digest* correctly called the following four presidential elections. In 1936, however, the *Digest* came unstuck. Its 2.3 million "voters" constituted a huge sample; however they were generally more affluent Americans who tended to have Republican sympathies. The *Literary Digest* did nothing to correct this bias. The week before election day, it reported that Alf Landon was far more popular than Franklin D. Roosevelt. At the same time, George Gallup conducted a far smaller, but more scientifically-based survey, in which he polled a demographically representative sample. Gallup correctly predicted Roosevelt's landslide victory. The *Literary Digest* went out of business soon afterwards, while the polling industry started to take off. Gallup launched a subsidiary in the United Kingdom, where it correctly predicted Labour's victory in the 1945 general election, in contrast with virtually all other commentators, who expected the Conservative Party, led by Winston Churchill, to win easily. By the 1950s, polling had spread to most democracies. Nowadays they reach virtually every country, although in more autocratic societies they tend to avoid sensitive political topics.

- 21- Which of the following is TRUE according to the passage?
- 1) Jackson was predicted to be ahead of Adams by about 150 votes in the first presidency opinion poll.
  - 2) There were a total of 504 people voting for two candidates in the contest for the US presidency in 1824.
  - 3) Straw votes were often used on a national scale to determine the next US president.
  - 4) The popularity of straw votes made them become more weighted and scientific over time.
- 22- The passage implies, about the *Literary Digest* survey, that it .....
- 1) stopped dealing with Presidency elections in 1936
  - 2) sent postcards to its readers about its predictions
  - 3) elected Woodrow Wilson as President in 1916
  - 4) was not based in a demographically representative sample
- 23- We may understand from the passage that .....
- 1) American presidents were Republicans from 1916 to 1936
  - 2) George Gallop started his survey business with the election of Roosevelt
  - 3) Alf Landon was an active supporter of *Literary Digest's* surveys
  - 4) Gallop was not a supporter of Republicans and tried to change people's mind
- 24- Which of the following about Gallop is TRUE according to the passage?
- 1) It made polling a common activity in all democracies by the 1950s.
  - 2) It forced the *Literary Digest* to end its activity in the US.
  - 3) It was in favour of Labor's victory in the 1950s United states.
  - 4) It disagreed with every other prediction on the victory of Churchill in 1945.
- 25- The 'circulation-raising exercise' in line 6 is one which .....
- 1) increases the number of issues published
  - 2) raises the price of each issue
  - 3) adds to the content published in each issue
  - 4) raises the quality of the issues printed

Statistical literacy is a term used to describe an individual's ability to understand statistics. Statistical literacy is considered by many to be necessary for citizens to understand material presented in publications such as newspapers, television and the internet. Numeracy is a prerequisite to being statistically literate. Each day people are inundated with statistical information from advertisements ("4 out of 5 dentists recommend"), news reports ("polls show the incumbent leading by four points"), and even general conversation ("half the time I don't know what you're talking about"). Experts and advocates often use numerical claims to bolster their arguments, and statistical literacy is a necessary skill to help one decide what experts mean and which advocates to believe. This is important because statistics can be made to produce lies and misrepresentations of data that may seem valid. The aim of statistical literacy proponents is to improve the public understanding of numbers and figures. Results of opinion polling are often cited by news organizations, but the quality of such polls varies considerably. Some understanding of the statistical technique of sampling is necessary in order to be able to correctly interpret polling results. Sample sizes may be too small to draw meaningful conclusions, and samples may be biased. The Alexa Internet web traffic reports, for example, are known to be biased for several reasons, one of which is that their toolbar only works with the Internet Explorer browser. The wording of a poll question may introduce a bias, and thus can even be used intentionally to produce a biased result. Good polls use large samples and unbiased techniques, with much time and effort being spent in the design of the questions and polling strategy. Statistical literacy is necessary to understand what makes a poll trustworthy and to properly weigh the value of poll results and conclusions.

- 26- Which of the following about statistical literacy is TRUE according to the passage?
- 1) The ability of the individual to succeed is affected by it.
  - 2) It deals with the material published, for example, in newspapers.
  - 3) It is presented in newspapers, television and the internet.
  - 4) There is no disagreement on its necessity for the whole society.
- 27- It is stated in the passage that .....
- 1) general conversation does not usually contain statistical information
  - 2) numeracy can not exist without knowledge of statistical literacy
  - 3) it is often impossible to understand experts without statistical literacy
  - 4) news reports are taken to be the most important factor in statistical literacy
- 28- The passage mentions that .....
- 1) the misrepresentation of data is a valid factor in statistics
  - 2) interpretation of polling results depends on understanding sampling
  - 3) the public understanding of numbers can be improved by statistical literacy proponents
  - 4) opinion polling is used by news organizations to vary considerably in quality
- 29- Which of the following is TRUE according to the passage?
- 1) A biased result for a poll question can be obtained simply through its wording.
  - 2) The toolbar for Alexa Internet web traffic reports does not work with Internet Explorer.
  - 3) A trustworthy poll is necessary if statistical literacy is to be valued properly.
  - 4) Large samples and unbiased techniques make up the question of a good polling strategy.
- 30- The expression 'inundated with' in line 5 means .....
- 1) 'questioned by'
  - 2) 'rained through'
  - 3) 'faced with'
  - 4) 'flooded by'

۳۱- زاویه بین دو صفحه  $2x + y - 7z + 11 = 0$  و  $5x - 2y + 5z - 12 = 0$  کدام است؟

- (۱) ۳۰ درجه  
(۲) ۷۵ درجه  
(۳) ۹۰ درجه  
(۴) ۱۲۰ درجه

۳۲- حد دنباله  $\left\{ n \sin \frac{\pi}{n} \right\}$  کدام است؟

- (۱) ۱  
(۲)  $\frac{\pi}{2}$   
(۳)  $\pi$   
(۴)  $\infty$

۳۳- فرض کنید  $[x]$  جزء صحیح  $x$  باشد. برد تابع  $g(x) = [x] - x$  کدام است؟

- (۱)  $(-1, 0]$   
(۲)  $(-1, 0)$   
(۳)  $[-1, 0]$   
(۴)  $\mathbb{R}$

۳۴- نقطه‌های  $A$  و  $B$  به ترتیب روی محور  $x$  ها و  $y$  ها قرار دارند و نقطه  $M$  وسط قطعه خط  $AB$  قرار دارد. معادله خط  $AB$  کدام است؟

- (۱)  $x + 2y = 8$   
(۲)  $4x + y = 11$   
(۳)  $2x + 3y = 12$   
(۴)  $3x + 2y = 12$

۳۵-  $\int_0^{2\pi} |\sin x| dx$  کدام است؟

- (۱) ۱  
(۲) ۲  
(۳) ۳  
(۴) ۴

۳۶- تابع  $y = |x^2 - 1|$  در  $x = 1$  در کدام گزینه صدق می‌کند؟

- (۱) پیوسته است.  
(۲) مشتق دارد.  
(۳) ماکزیمم دارد.  
(۴) حد ندارد.

۳۷- شعاع همگرایی سری توانی  $1 + 2x + 3^2 x^2 + 2^2 x^2 + 3^4 x^4 + 2^5 x^5 + \dots$  کدام است؟

- (۱)  $\frac{1}{4}$   
(۲)  $\frac{1}{3}$   
(۳)  $\frac{1}{2}$   
(۴)  $\frac{2}{3}$

۳۸- دنباله  $\{x_n\}$  حد دارد و به صورت  $x_1 = 2$  و  $n = 1, 2, \dots$  و  $2x_{n+1} = x_n + \frac{5}{x_n}$  تعریف شده است.  $\lim_{n \rightarrow \infty} x_n$  کدام است؟

- (۱)  $\frac{1 + \sqrt{5}}{2}$   
(۲)  $\sqrt{5}$   
(۳)  $\frac{\sqrt{5} - 1}{2}$   
(۴)  $\frac{\sqrt{2} + 5}{2}$

۳۹- اگر  $f(x) = \begin{cases} \frac{g(x)}{x} & x \neq 0 \\ 0 & x = 0 \end{cases}$  ،  $g(0) = g'(0) = 0$  ،  $g''(0) = 70$  ،  $f'(0)$  کدام است؟

- (۱) ۰  
(۲)  $\frac{1}{2}$   
(۳) ۲۵  
(۴) ۷۰

۴۰- جرمی با چگالی  $p(x, y) = 1 + 2x + y$  در ناحیه مثلثی شکل به رئوس  $(0, 0)$  ،  $(1, 0)$  و  $(0, 2)$  توزیع شده است، اندازه جرم کدام است؟

- (۱)  $\frac{3}{8}$   
(۲) ۲  
(۳)  $\frac{8}{3}$   
(۴) ۵

۴۱- مقدار  $\iint_A e^{-2x-3y} dx dy$  که در آن  $A = \{(x, y) : x \geq 0, y \geq 0\}$  کدام است؟

- (۱)  $\frac{1}{6}$   
(۲) ۱  
(۳) ۶  
(۴)  $\infty$

۴۲- مشتق تابع  $G(x) = \int_0^x e^{-t^2} dt$  در  $x = 0$  کدام است؟

- (۱)  $\frac{1}{2}$   
(۲) ۱  
(۳) ۲  
(۴) صفر

۴۳- مقدار انتگرال خط  $\int_C x^2 dx + xy dy$  که در آن  $C$  مثلثی به رئوس  $(0, 0)$  ،  $(1, 0)$  و  $(0, 1)$  است و در جهت عکس عقربه‌های ساعت طی می‌شود کدام است؟

- (۱)  $\frac{1}{6}$   
(۲)  $\frac{1}{3}$   
(۳)  $\frac{1}{2}$   
(۴) ۱

۴۴- حجم محصور بین صفحه  $xOy$  و سهمیگون  $z = 1 - x^2 - y^2$  کدام است؟

- (۱)  $\frac{\pi}{4}$   
(۲)  $\frac{\pi}{3}$   
(۳)  $\frac{\pi}{2}$   
(۴) ۱

۴۵- مقدار انتگرال تابع  $f(x, y) = xy$  در ناحیه  $0 < x < y < 1$  کدام است؟

- (۱)  $\frac{1}{8}$   
(۲)  $\frac{1}{4}$   
(۳)  $\frac{1}{2}$   
(۴) ۱

۴۶- انتگرال سه گانه  $I = \iiint_V (x+y+z)^2 dV$  که در آن  $V$  ناحیه محدود به صفحه  $x+y+z=1$  و صفحات مختصات است، کدام است؟

- (۱)  $\frac{1}{2}$   
 (۲)  $\frac{1}{3}$   
 (۳)  $\frac{1}{4}$   
 (۴)  $\frac{1}{10}$

۴۷- معادله صفحه مماس بر سهمیگون  $z = 2x^2 + y^2$  در نقطه‌ای به طول ۱ و عرض ۲ کدام است؟

- (۱)  $4x - 2y - z = -3$   
 (۲)  $4x + 2y - z = -3$   
 (۳)  $4x - 2y - z = 3$   
 (۴)  $4x + 2y - z = 3$

۴۸- اگر  $z = e^x \sin y$ ،  $x = st^2$  و  $y = s^2t$ ، مقدار  $\frac{\partial z}{\partial t}$  به ازای  $t=0$  و  $s=1$  کدام است؟

- (۱) -۱  
 (۲) ۰  
 (۳) ۱  
 (۴) ۲

۴۹- مشتق جهتدار تابع  $f(x,y) = x^3 - 3xy + 4y^2$  در نقطه  $(1,2)$  و در جهت  $u = \left(\frac{\sqrt{3}}{2}, \frac{1}{2}\right)$  کدام است؟

- (۱)  $-\frac{1}{2}(13+3\sqrt{3})$   
 (۲)  $\frac{1}{2}(13-3\sqrt{3})$   
 (۳)  $\frac{1}{2}(3\sqrt{3}-13)$   
 (۴)  $\frac{1}{2}(13+3\sqrt{3})$

۵۰- نقطه  $(-2,3)$  و مقدار  $-13$  برای تابع  $f(x,y) = x^2 + 4x + y^2 - 6y$  چه نوع نقطه و مقداری هستند؟

- (۱) نقطه ماکسیمم و مقدار ماکسیمم نسبی  
 (۲) نقطه می نیمم نسبی و مقدار می نیمم نسبی  
 (۳) نقطه زینی و مقدار معمولی  
 (۴) نقطه غیر بحرانی و مقدار معمولی

۵۱- اگر تابع  $f: [a,b] \rightarrow \mathbb{R}$  پیوسته و یک به یک باشد و  $f(a) < f(b)$ ، به ازای هر  $x \in (a,b)$  کدام رابطه برقرار است؟

- (۱)  $f(x) < f(a)$   
 (۲)  $f(x) > f(a)$   
 (۳)  $f(x) < f(b)$   
 (۴)  $f(x) > f(b)$

۵۲- کدام تابع روی  $\mathbb{R}$  پیوسته یکنواخت نیست؟

- (۱)  $f(x) = \sin(x)$   
 (۲)  $f(x) = \cos(x)$   
 (۳)  $f(x) = \frac{1}{x^2+1}$   
 (۴)  $f(x) = x^2+1$

۵۳- اگر  $A \subseteq \mathbb{R}^2$  و  $\partial(A)$  مجموعه نقاط مرزی  $A$  باشد، کدام عبارت صحیح است؟

- (۱)  $\partial(A \times B) = (\partial(A) \times \bar{B}) \cup (\bar{A} \times \partial(B))$   
 (۲)  $\partial(A \times B) = \partial(A) \times \partial(B)$   
 (۳)  $\partial(A \times B) = \overline{A \times B} - A \times B$   
 (۴)  $\partial(A \times B) = (\partial(A) \times B) \cup (A \times \partial(B))$

۵۴- اگر  $A \subseteq \mathbb{R}^n$  و  $B \subseteq \mathbb{R}^m$ ، کدام گزاره نادرست است؟

- (۱)  $A \times B$  تهی  $\Leftrightarrow A$  و  $B$  تهی باشد.  
 (۲)  $A \times B$  همبند  $\Leftrightarrow A$  و  $B$  همبند باشد.  
 (۳)  $A \times B$  فشرده  $\Leftrightarrow A$  و  $B$  فشرده باشد.  
 (۴)  $A \times B$  باز  $\Leftrightarrow A$  و  $B$  باز باشد.



- ۵۵- مجموعه اعداد حقیقی را با متر گسسته  $d_1$  در نظر بگیرید. کدام گزاره درست است؟  
 (۱)  $Q$  در  $(R, d_1)$  باز نیست.  
 (۲)  $Q$  در  $(R, d_1)$  بسته و کراندار است.  
 (۳)  $Q$  در  $(R, d_1)$  فشرده است.  
 (۴)  $Q$  همبند است.
- ۵۶- در یک فضای متریک  $X$  کدام گزاره نادرست است؟  
 (۱) اشتراک هر خانواده دلخواه از زیر مجموعه‌های فشرده  $X$ ، فشرده است.  
 (۲) اشتراک هر زیر مجموعه فشرده و هر زیر مجموعه بسته از  $X$ ، فشرده است.  
 (۳) اجتماع هر خانواده دلخواه از زیر مجموعه‌های فشرده  $X$ ، فشرده است.  
 (۴) هر زیر مجموعه فشرده  $X$ ، بسته است.
- ۵۷- فرض کنید  $X$  یک فضای متریک بوده و تابع  $f: X \rightarrow R$  پیوسته باشد. اگر  $A = \{x \in X: 2 \leq f(x) \leq 3\}$  و  $B = \{x \in X: f(x) > 1\}$ ، کدام گزاره درست است؟  
 (۱) مجموعه  $A \cap B$  مجموعه‌ای باز است.  
 (۲) مجموعه  $B - A$  مجموعه‌ای بسته است.  
 (۳) مجموعه  $(A \cap B)$  مجموعه تهی است.  
 (۴) مجموعه  $A \cup B$  مجموعه‌ای باز است.
- ۵۸- هر گاه  $f: R^2 \rightarrow R$  توسط  $f(x, y) = \begin{cases} x^2 + y^2 & x, y \in Q \\ 0 & \text{در غیر این صورت} \end{cases}$  تعریف شده باشد، کدام گزاره درست است؟  
 (۱)  $f$  در هیچ نقطه‌ای پیوسته نمی‌باشد.  
 (۲)  $f$  در  $Q \times Q$  پیوسته است.  
 (۳)  $f$  در  $(0, 0)$  پیوسته است.  
 (۴)  $f$  همواره پیوسته است.
- ۵۹- هر گاه  $\{x_n\}$  دنباله‌ای کراندار در  $R$  باشد، کدام گزاره درست می‌باشد؟  
 (۱) یک زیر دنباله صعودی و همگرا از  $\{x_n\}$  وجود دارد.  
 (۲) یک زیر دنباله یکنوای همگرا از  $\{x_n\}$  وجود دارد.  
 (۳) یک زیر دنباله نزولی و همگرا از  $\{x_n\}$  وجود دارد.  
 (۴) یک زیر دنباله یکنوای همگرا از  $\{x_n\}$  وجود ندارد.
- ۶۰- برای هر دنباله کراندار  $\{x_n\}$  در  $R$ ، کدام یک از گزاره‌های زیر صحیح نیست؟  
 (۱) یک زیر دنباله همگرا به  $\limsup(x_n)$  موجود است.  
 (۲) یک زیر دنباله همگرا به  $\liminf(x_n)$  موجود است.  
 (۳)  $\liminf(x_n) \leq \limsup(x_n)$   
 (۴) یک زیر دنباله صعودی  $\{x_n\}$  موجود است که به  $\limsup(x_n)$  همگرا است.