

## 专业外语 试卷

考生注意：请按题目要求将答案直接写在答题纸上，请在每张答题纸上务必写上姓名、学号、专业方向。

### 一、 将下列英文节选翻译成中文。

- 1、 While the word "algebra" comes from Arabic word, its origins can be traced to the ancient Babylonians, who developed an advanced arithmetical system with which they were able to do calculations in an algebraic fashion. With the use of this system they were able to apply formulas and calculate solutions for unknown values for a class of problems typically solved today by using linear equations, quadratic equations, and indeterminate linear equations. By contrast, most Egyptians of this era, and most Indian, Greek and Chinese mathematicians in the first millennium BC, usually solved such equations by geometric methods, such as those described in the Rhind Mathematical Papyrus, Sulba Sutras, Euclid's Elements, and The Nine Chapters on the Mathematical Art. The geometric work of the Greeks, typified in the Elements, provided the framework for generalizing formulae beyond the solution of particular problems into more general systems of stating and solving equations.
- 2、 Mathematics arises wherever there are difficult problems that involve quantity, structure, space, or change. At first these were found in commerce, land measurement and later astronomy; nowadays, all sciences suggest problems studied by mathematicians, and many problems arise within mathematics itself. For example, the physicist Richard Feynman invented the path integral formulation of quantum mechanics using a combination of mathematical reasoning and physical insight, and today's string theory, a still-developing scientific theory which attempts to unify the four fundamental forces of nature, continues to inspire new mathematics. Some mathematics is only relevant in the area that inspired it, and is applied to solve further problems in that area. But often mathematics inspired by one area proves useful in many areas, and joins the general stock of mathematical concepts. The remarkable fact that even the "purest" mathematics often turns out to have practical applications is what Eugene Wigner has called "the unreasonable effectiveness of mathematics."
- 3、 Understanding and describing change is a common theme in the natural sciences, and calculus was developed as a powerful tool to investigate it. Functions arise here, as a central concept describing a changing quantity. The rigorous study of real numbers and real-valued functions is known as real analysis, with complex analysis the equivalent field for the complex numbers. The Riemann hypothesis, one of the most fundamental open questions in mathematics, is drawn from complex analysis. Functional analysis focuses attention on (typically infinite-dimensional) spaces of functions. One of many applications of functional analysis is quantum mechanics. Many problems lead naturally to relationships between a quantity and its rate of change, and these are studied as differential equations. Many phenomena in nature can be described by dynamical systems; chaos theory makes precise the ways in which many of these systems exhibit unpredictable yet still deterministic behavior.

## 二、 将下列英文节选翻译成中文。

- 1、很久以前，数学即被应用于生物学的研究中。然而直到最近，这一领域才引起人们足够的重视，其原因包括： 由于基因学的发展，生物学家采集到的大量数据必须通过解析方法加以处理； 数学理论，特别是混沌理论的发展，使人们对复杂性系统的认识更加深刻，从而提供了研究生物学中非线性动力过程的工具和方法； 计算机科学的发展使大规模计算和模拟成为可能； 基于人类与动物研究中的复杂性，人们对“*In silico*”的兴趣与日俱增。
- 2、傅立叶分析，又称调和分析，是数学的一个分支领域。它研究如何将一个函数或者信号表达为基本波形的叠加。它研究并扩展傅立叶级数和傅立叶变换的概念。基本波形称为调和函数，调和分析因此得名。在过去两个世纪中，它已成为一个广泛的主题，并在诸多领域得到广泛应用，如信号处理、量子力学、神经科学等。对于定义于  $\mathbf{R}^n$  上的经典傅立叶变换的研究，特别是在作用于更一般的对象上的傅立叶变换的研究，仍然是一个十分活跃的研究领域。例如，如果在函数或者信号上加上一个分布  $f$ ，我们可以试图用  $f$  的傅立叶变换来表达这些要求。Paley-Wiener 定理就是这样的一个例子。
- 3、“欧几里德最喜欢用的反证法，是数学家最精良的武器。它比起棋手所用的任何战术还要好：棋手可能需要牺牲一只兵或其他棋，但数学家用的却是整个游戏。”反证法（又称归谬法）是使用反例来证明正面命题的真确性的一种数学证明方式。对一科学理论归谬不成立时，即反证成。简单来说要证明某命题成立，先假设该命题为错，然后证明该假设为错，则命题成立。维也纳的科学哲学家卡尔·波普尔（Karl Popper）的论点：“不能被反证的理论就不能被称作科学的理论”。

## 三、 按如下要求完成英语短文写作（注意：硕士、博士有不同要求）。

**Direction:** Write an essay with no more than 500 words, including a schematic description of the time schedule for your postgraduate research, a brief introduction of your currently involved scientific research project, and a brief prospect of your future career pursuit. Particularly, for those PHD candidates, please also provide some comments and suggestions on postgraduate-course-setting in our school in the essay.