平成24年度
鹿児島大学大学院理工学研究科入学試験
博士前期課程　数理情報科学専攻

英語

平成24年2月14日(火)　10:00-11:30

注意.

1. 配布物は, 問題冊子 (A4, 3 枚), 解答用紙 (B4, 2 枚), 草案用紙 (B4, 2 枚) である.
2. 試験開始の合図があるまで, 問題冊子を開いてはならない.
3. 出題数は $\boxed{1}$, $\boxed{2}$ の 2 題で, 2 題とも解答せよ.
4. 試験開始後, すべての解答用紙に受験番号を記入せよ.
5. 解答用紙が不足する場合には裏面を使用してもよい.
6. 英和辞書を使用してもよいが, 電子辞書の使用は認めない.
7. 問題冊子と草案用紙は持ち帰ること.

1 以下の英文の全文を和訳せよ.

Theorem. *Let f and g be continuous functions such that the values of f are contained in the domain of definition of g. Then $g \circ f$ is continuous.*

Proof. Let x_0 be a number at which f is defined, and let

$$y_0 = f(x_0).$$

Given $\epsilon > 0$, since g is continuous at y_0, there exists $\delta_1 > 0$ such that if $|y - y_0| < \delta_1$, then

$$|g(y) - g(y_0)| < \epsilon.$$

Now with the above δ_1 being given, there exists $\delta > 0$ such that if $|x - x_0| < \delta$ then

$$|f(x) - f(x_0)| < \delta_1.$$

Hence

$$|g(f(x)) - g(f(x_0))| < \epsilon,$$

thus proving our theorem.

出典：Serge Lang, "A First Course in Calculus, Fifth Edition", Springer, 1986.

$\boxed{2}$ 以下の英文の全文を和訳せよ.

Let V, W be vector spaces, and let $F : V \to W$ be a linear map. The set of elements $v \in V$ such that $F(v) = 0$ is called the **kernel** of F.

Example 1. Let $L : R^3 \to R$ be the map such that

$$L(x, y, z) = 3x - 2y + z.$$

Thus if $A = (3, -2, 1)$, then we can write

$$L(X) = X \cdot A = A \cdot X.$$

Then the kernel of L is the set of solutions of the equation

$$3x - 2y + z = 0.$$

Of course, this generalizes to n-space. If A is an arbitrary vector in R^n, we can define the linear map

$$L_A : R^n \to R$$

such that $L_A(X) = A \cdot X$. Its kernel can be interpreted as the set of all X which are perpendicular to A.

出典：Serge Lang, "Introduction to linear algebra", Addison-Wesley, 1970.