

# 平成24年度 推薦入試 基礎学力検査

## 数 学

### 注 意 事 項

1. 基礎学力検査開始の合図があるまで、この問題冊子と解答冊子を開かないください。
2. 問題は全部で4問あります(1ページから2ページ)。
3. 解答冊子の中には、解答用紙12枚と計算用紙が一緒にとじてあります。解答冊子のどのページも切り離してはいけません。
4. 解答冊子の表紙の所定欄に氏名(1箇所)と受験番号(2箇所)をはっきりと記入してください。
5. 基礎学力検査中に問題冊子の印刷不明瞭、ページの落丁・乱丁および解答用紙の汚れ等に気がついた場合は、静かに手を上げて監督員に知らせてください。
6. 基礎学力検査終了後、問題冊子は持ち帰ってください。
7. 解答時間は90分です。
8. 設問ごとに配点が記されています。
9. 解答用紙には、答えだけでなく、結論に至る過程を必ず記述してください。

I 以下の問いに答えよ．（配点 35 点）

問 1  $y = x^2 - 4x + 3$  のグラフを描け．

問 2  $y = |x^2 - 4|$  のグラフを描け．

問 3 不等式  $|x^2 - 4| < x^2 - 4x + 3$  を解け．

II 袋の中に赤玉が  $n - 3$  個，白玉が 3 個入っている．ただし， $n \geq 5$  とする．この袋から 3 個の玉を同時に取り出したとき，赤玉が 2 個である確率を  $P_n$  とする．以下の問いに答えよ．（配点 40 点）

問 1  $n = 5$  のときの確率  $P_5$  を求めよ．

問 2  $P_{n+1} = P_n$  となる  $n$  を求めよ．

問 3  $P_n$  が最大となる  $n$  をすべて求め，そのときの  $P_n$  を求めよ．

III 関数  $f(x) = x^3 - x$  について，以下の問いに答えよ．（配点 40 点）

問 1  $f(x)$  の導関数  $f'(x)$  を求めよ．

問 2  $y = |f'(x)| - 1$  のグラフを描け．

問 3  $y = |f'(x)| - 1$  のグラフと  $x$  軸で囲まれる部分の面積を求めよ．

IV 以下の問いに答えよ．（配点 35 点）

問 1  $\cos 2\theta$  を  $\cos \theta$  で表せ．

問 2  $\cos \theta = \frac{1}{3}$  のとき， $\cos 3\theta$  の値を求めよ．

問 3  $0 < \theta < \pi$  のとき，不等式  $\cos 3\theta - 8 \cos^2 \theta + 6 > 0$  を解け．

問題は，このページで終了である．

**2012 Entrance Exam (Achievement Test)  
for recommended applicants**  
**平成24年度 特別選抜(推薦)入試基礎学力検査**

**English 英語**  
**100点**

Notices 注意事項

1. Do not open this exam until you are given instructions to begin. 基礎学力検査開始の合図があるまで、この問題冊子を開かないでください。
2. Answer sheets are separated from the question sheets (Questions are on pages 1-6). Please submit only the answer sheets. 問題冊子(問題は1~6ページにあります)と解答冊子は別々になっています。解答冊子のみを提出してください。
3. Do not forget to write your name and your applicant number on your cover sheet. 解答冊子の表紙に忘れずに氏名(1箇所)と受験番号(2箇所)を記入してください。
4. If you find some incomplete printing or collating, please let the supervisor know by raising your hand silently. 基礎学力検査中に問題冊子の印刷不明瞭やページの落丁・乱丁あるいは解答用紙の汚れ等に気がついた場合は、静かに手を上げて監督員に知らせてください。
5. Please take the question sheets with you after finishing the exam. 基礎学力検査終了後、問題冊子は持ち帰ってください。
6. You have 60 minutes. 試験時間は60分です。
7. You may use a dictionary. The questions are written in English and/or Japanese. Please read the instructions carefully. 辞書を使用することができます。また、問題文は英語または日本語で書かれていますので、指示を注意深く読んでから解答してください。
8. Points are indicated for each of the questions. 設問ごとに配点が記されています。

## Part 1 Reading Comprehension

次の文章を読み，以下の問いに答えよ。

(配点 70 点)

### Will technology make learning languages unnecessary?

In the past, if you wanted to speak with people who did not speak your language, you had to have some mastery over their language or a mutually shared language. If you wanted to write well in another language, you may have had access to a dictionary, but you still needed to have mastered the grammar and syntax of that language. However, technological advances have reduced the need to learn other languages. Furthermore, in the near future, advances in machine translation (MT) and artificial intelligence will make the learning of other languages a thing of the past.

The opinion in the preceding paragraph is an extreme one. A more realistic view is that despite advances in technology, people will still need to learn other languages because technology will, for the foreseeable future, be unable to cope with languages in many natural settings. To appreciate this view, consider what technology can already accomplish in the field of translation.

Most people who access the Internet have come across online MT systems, which can translate text from one language to another. The traditional input method for MT software has required users to type (or paste in) some text and then click on a ‘translate’ button. Recently, two other input methods have become popular. One is the use of speech recognition (SR) software. Rather than typing, a user speaks into a device, and the SR software converts that speech to text, which is then translated by the MT software. Another method of input is facilitated by optical character recognition (OCR) software. An image of text is converted by OCR software into ‘real’ text, which is then translated by the MT software into the target language. As for output, text in one language is outputted as text in another, which the user then reads, shows to others, or pastes into a document. With the addition of Text-To-Speech (TTS) software, outputted text can be converted into audible language. In this way, people can, in effect, listen to you speaking in their own language.

All of these technologies exist, and have been incorporated into various devices. The increasing portability of powerful digital devices such as smart phones makes it easy to imagine scenarios in which a combination of these technologies can make

communication in foreign languages possible without a need to learn them. So, why bother learning other languages?

The answer is that now, and for many years to come, MT software will only be able to cope with controlled input. In other words, in order to get reasonable translations, a user has to control or limit the language that she inputs into MT software. For example, MT software is not good at coping with long sentences or colloquial and idiomatic phrases. Equally, MT software is poor at translating large amounts of text since it is usually unable to recognise the connections between words and concepts in different sentences. Furthermore, it doesn't understand context and nonverbal cues, things that humans can naturally perceive and incorporate into their interpretation of language. SR software performs poorly in noisy environments, and so can only effectively be used when the sound input is controlled, for instance, just one person speaking at a time in a quiet setting. OCR is most effective when the text that the OCR software is trying to recognise is clearly written, preferably printed, and not obscured by other text, or objects. TTS software is quite advanced, but its output is only as good as its input. To conclude, even though MT capable devices will become increasingly available, if you want to comprehend anything more than short unconnected sentences, or communicate effectively in anything more than simple phrases, you do need to learn one or more other languages.

(1)

次の(ア)から(カ)のそれぞれの文について，その内容が本文で著者が述べていることと一致するものには  ，そうでないものには×をつけよ．(配点 30 点)

- (ア) Learning other languages is now a thing of the past.
- (イ) MT software is good at translating complex naturally occurring language.
- (ウ) MT software can translate controlled and limited text.
- (エ) OCR software converts an image of text so that it can be translated by MT software.
- (オ) TTS software converts written text into spoken language.
- (カ) Typing text is the only way to input language into MT software.

(2)

一つの言語の話し言葉を別の言語の話し言葉へと変換する過程の記述として正しいものを，次の(ア)から(エ)の選択肢の中から一つ選び，記号で答えよ．(配点 10 点)

- (ア) MT ⇒ TTS ⇒ SR
- (イ) OCR ⇒ MT ⇒ TTS
- (ウ) SR ⇒ MT ⇒ TTS
- (エ) TTS ⇒ OCR ⇒ SR

(3)

本文の内容にもっともよく合致するものを，次の(ア)から(エ)の選択肢の中から一つ選び，記号で答えよ．(配点 10 点)

- (ア) MT software cannot be relied on because speech and optical recognition input methods are now too advanced.
- (イ) The author thinks that MT software is reliable because it will soon be able to cope with most situations in which language is used.
- (ウ) The author claims that MT software is unable to perceive certain essential aspects of language and communication.
- (エ) The author believes translation technology can be effectively used in most situations, but also argues that we should still learn another language.

(4)

本文の要約(要旨)として最も適切なものを, 次の(ア)から(エ)の選択肢の中から一つ選び, 記号で答えよ。(配点 20 点)

- (ア) At the moment, MT software is unable to translate anything but short phrases. However, in the near future, we can expect both the methods of input and output to improve significantly. Because of these advances in artificial intelligence, the only reason to learn another language will be to comprehend short sentences.
- (イ) The abundance of devices capable of translating languages means that there is no real need to learn other languages. ‘Input’ technology such as SR and OCR software can convert almost any language into text that MT software can then correctly change into another language.
- (ウ) The author believes that learning other languages will soon become a thing of the past. MT software is already good at translating language in various situations, and in the foreseeable future will be even better. Because of these technological advances, he argues that there will soon be no reason to learn other languages.
- (エ) The author describes an extreme vision of the future in which people will not need to learn other languages. He goes on to argue that this vision is wrong because MT software can and will only be able to cope with controlled language input. For this reason, he advises the reader to learn one or more other languages.

## Part 2 Personal Response to the Writing

Part1 で論じられていた内容に関連して，以下の (1) または (2) の問いから，どちらか一つを選択して英語で答えよ．解答は英文として明瞭かつ論理的に表現されていれば，どのような立場のものでも可とするが，箇条書きのような書き方をせずに，必ず完全な英語の文章で答えること．解答欄には選択した問題の番号を明記すること． (配点 30 点)

- (1) In your own words, write a paragraph (at least 50 words) convincing a 12-year-old to learn a new language.

または

- (2) In your own words, write a paragraph (at least 50 words) explaining how technology can both help and hinder learning.