

## 「小論文」

令和2年8月23日（日）13:15～15:40

2021 Entrance Examination, Department of Technology Management for Innovation,  
Graduate School of Engineering, The University of Tokyo

## Short Thesis

13:15 – 15:40, Sunday, August 23, 2020

### 注意事項 General instructions

- 解答開始の合図があるまで、この画面を表示したままにし、指示された以外の PC 操作をしないで下さい。Keep this page displayed on your screen until you are instructed to start the answer time. Never operate your PC other than instructed.
- 質問がある場合、カメラに見えるように、その場で静かに挙手をして下さい。If you have a question, please raise your hand quietly so that the proctor can see your hand through the webcam.
- ブラウザは常に全画面表示にするか、画面いっぱい拡大した状態にして下さい。Always set your browser a full screen mode or maximize it to fit your display size.
- スクリーンセーバーは予め切っておくこと。Turn off the screen saver beforehand.
- PC 上の不必要なアプリケーションは事前にすべて終了させておくこと。Terminate all unnecessary applications on your PC in advance.
- 試験時間は 13:15 から 15:40 ですが、部屋の環境チェックなどの時間も含まれています。Examination time is from 13:15 to 15:40, including time for checking your room environment, etc.
- 問題は全部で 2 問あり、それぞれに与えられる解答時間は 40 分です。Two problems are given in total. The time that you can use to answer each problem is 40 minutes.
- 解答開始の指示後に、問題が画面に表示されない場合は申し出ること。Inform the proctor if the question is not presented on your screen after you are instructed to start.
- 定められた以外の操作をした場合は、不正とみなされることがあります。If you operate your PC other than instructed, it may be considered as a misconduct.
- 解答時間終了時、入力されている情報をすべて解答とみなします。解答途中でメモ書きをすることは構いませんが、試験終了前には削除して下さい。When the answer time is over, all information you have typed in so far are regarded as your answer. Although you can put notes during the answer time, please delete them before finishing.
- 解答開始後に試験監督者から個別に連絡する必要がある場合、Word Online のコメント機能を使ってメッセージが送信されることがあります。If the proctor contacts you individually after the answer time starts, you may receive a message from Word Online's comment feature.
- 緊急の連絡の必要が生じた場合には、監督者からスマートフォン・携帯電話に電話をかけることがあります。In case of emergency contact, the proctor may call your smartphone or mobile phone.
- 解答開始の指示後に、Zoom が一定時間ネットワーク接続できなくなった時点で、解答終了とみなします。After the answer time starts, if Zoom cannot connect to the network for a certain length of time, it is considered that your answer time is finished.
- 受験番号を忘れず入力すること。Be sure to type in your examinee number.

受験番号 Examinee number \_\_\_\_\_

問1 事前に送付した PageRank に関する原著論文について、以下の問いに答えよ。

当該論文が発表された 1998 年当時のインターネット社会では、PageRank という新しい評価指標は画期的なものであった。一方、現在の複雑化したインターネット社会において、PageRank が依然として通用する部分と通用しない部分について、具体的な PageRank のメカニズムの原理を現在のインターネット技術に対比させながら、800 字以内で論じよ。

Problem 1 Answer the following question with regard to the paper on PageRank, which was sent to you beforehand:

Among the Internet society in 1998, when the paper was published, PageRank was epoch-making. On the other hand, among the more complexed Internet society in the current era, PageRank is still effective in some parts, but is not in others. Describe in 400 words in which parts it is still effective and in which parts it is not by contrasting the principle of the PageRank mechanism with the current Internet technologies.

問2 次の「Mandated Bacillus Calmette-Guérin (BCG) vaccination predicts flattened curves for the spread of COVID-19」と題する論文 (M. Berg et al., Science Advances, Vol.6, No. 32, 2020) の抄録 (Abstract) を読んで以下の問いに答えよ。

Problem 2 Read the following abstract of a paper entitled “Mandated Bacillus Calmette-Guérin (BCG) vaccination predicts flattened curves for the spread of COVID-19” (M. Berg et al., Science Advances, Vol.6, No. 32, 2020), and answer the question.

**Abstract:**

Bacillus Calmette-Guérin (BCG) vaccination may reduce the risk of a range of infectious diseases, and if so, it could protect against coronavirus disease 2019 (COVID-19). Here, we compared countries that mandated BCG vaccination until at least 2000 with countries that did not. To minimize any systematic effects of reporting biases, we analyzed the rate of the day-by-day increase in both confirmed cases (134 countries) and deaths (135 countries) in the first 30-day period of country-wise outbreaks. The 30-day window was adjusted to begin at the country-wise onset of the pandemic. Linear mixed models revealed a significant effect of mandated BCG policies on the growth rate of both cases and deaths after controlling for median age, gross domestic product per capita, population density, population size, net migration rate, and various cultural dimensions (e.g., individualism). Our analysis suggests that mandated BCG vaccination can be effective in the fight against COVID-19.

この論文では、COVID-19の感染者数、死者数の増加率とBCGワクチン強制接種との間に相関があるという結果が示されている。この結果が正しいとしても、BCGワクチンがCOVID-19の予防に効果があるとは科学的に主張できない理由を述べよ。さらに、その効果を科学的に立証するためにはどんな研究や調査が必要か、実施の可能性も含めて、合計800字以内で論じよ。

This paper shows that there is a correlation between the rate of the increase in both confirmed COVID-19 cases and deaths and mandated BCG vaccination. Even if it is correct, it cannot be claimed scientifically that BCG vaccination is effective in preventing COVID-19 infection. Write reasons for that. Also, in order to scientifically verify that it is effective, what kind of research and/or survey are necessary, and how feasible are they? Write your answer in 400 words in total.