'19

推 薦

医学部医学科小論文問題2

注意事項

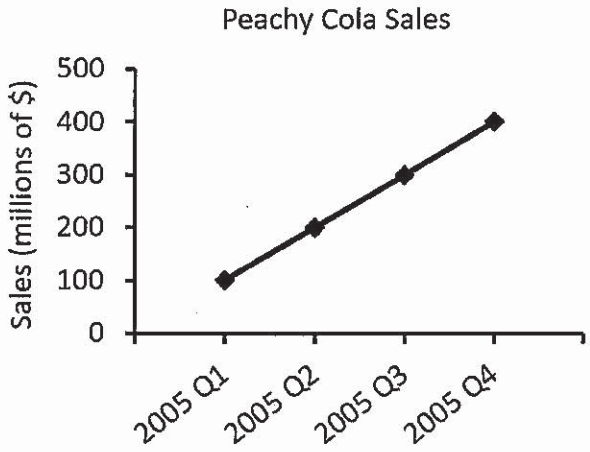
1. 試験開始の合図があるまでこの問題冊子を開いてはいけません。
2. この問題冊子のページ数は 10 ページです。問題冊子、解答用紙（4 枚）、及び下書き用紙（2 枚）に落丁、乱丁、印刷不鮮明などの箇所がある場合には申し出てください。
3. 解答は指定の解答用紙に記入してください。
   (1) 文字はわかりやすく、横書きで、はっきりと記入してください。
   (2) 解答の字数に制限のある場合は、それを守ってください。
   (3) 解答用紙にマス目のある場合は、訂正、挿入の語句は余白に記入してください。
   (4) ローマ字、または数字を使用するときは、マス目にとらわれなくてもかまいません。
4. 試験時間は 90 分です。
5. 解答用紙は持ち帰ってはいけません。
6. 問題冊子と下書き用紙は持ち帰ってください。

次の文章を読み、問 1～9 に答えなさい。*のついた語句には文末に訳注があります。

HIJINKS* WITH HOW NUMBERS ARE REPORTED

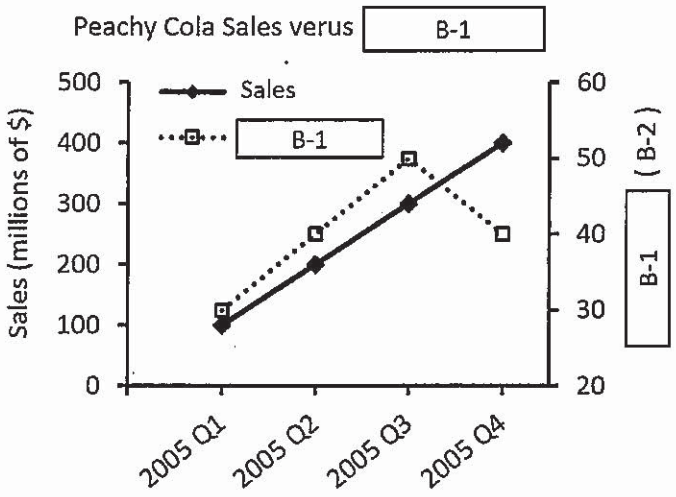
You're trying to decide whether to buy stock in a new soft drink and you come across this graph of the company's sales figures in their annual quarterly report (Figure 1):

Figure 1



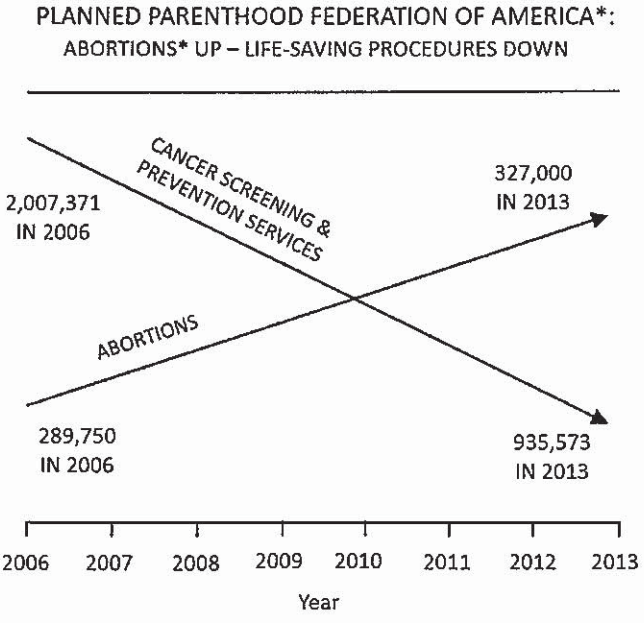
This looks promising—Peachy Cola is steadily increasing its sales. So far, so good. But a little bit of world knowledge can be applied here to good effect. The soft-drink market is very competitive. Peachy Cola's sales are increasing, but maybe not as quickly as a competitor's. As a potential investor, what you really want to see is how Peachy's sales compare to those of other companies, or to see their sales as a function of market share—Peachy's sales could go up only slightly while the market is growing (A) enormously, and competitors are benefiting more than Peachy is. And, as this example of a useful double y-axis graph demonstrates, this may not bode well for* their future (Figure 2):

Figure 2



Although unscrupulous* graph makers can monkey with* the scaling of the right-hand axis to make the graph appear to show anything they want, this kind of double-y-axis graph isn't scandalous because the two y-axes are representing different things, quantities that couldn't share an axis. This was not the case with the Planned Parenthood graph as shown in Figure 3, which was reporting the same quantity on the two different axes, the number of performed procedures. That graph was distorted by ensuring that the two axes, although they measure the same thing, were scaled differently in order to manipulate perception.

Figure 3

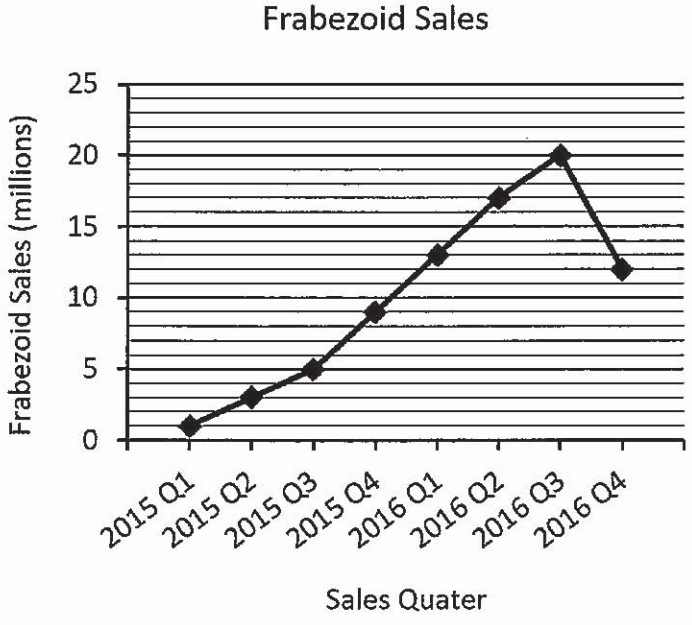


It would also be useful to see Peachy's profits: Through manufacturing and distribution efficiencies, it may well be that they're making more money on a lower sales volume. Just because someone quotes you a statistic or shows you a graph, it doesn't mean it's relevant to the point they're trying to make. It's the job of all of us to make sure we get the information that matters, and to ignore the information that doesn't.

Let's say that you work in the public-affairs office for a company that manufactures some kind of device—frabezoids*. For the last several years, the public's appetite for frabezoids has been high, and sales have increased. The company expanded by building new facilities, hiring new employees, and giving everyone a raise. Your boss comes into your cubicle* with a somber*-looking expression and explains that the newest sales results are in, and frabezoid sales have dropped (C) percent from the previous quarter. Your company's president is about to hold a big press conference to talk about the future of the company. As is his custom, he'll display a large graph on the stage behind him showing how frabezoids are doing. If word gets out about the lower sales figures, the public may think that frabezoids are no longer desirable things to have, which could then lead to an even further decline in sales.

What do you do? If you graph the sales figures honestly for the past two years, your graph would look like this (Figure 4):

Figure 4

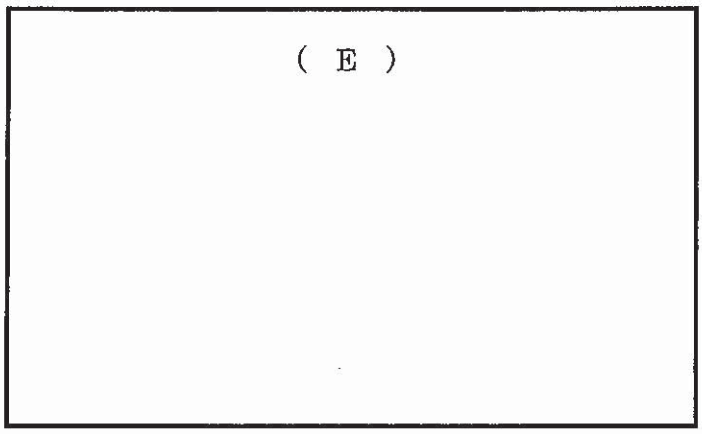


That downward trend in the curve is the problem. If only there were a way to make that curve go up.

Well, there is! The cumulative sales graph. Instead of graphing sales per quarter, graph the cumulative sales per quarter—that is, the total sales to date.

(D) As long as you sold only one frabezoid, your cumulative graph will increase, like this one here (Figure 5):

Figure 5



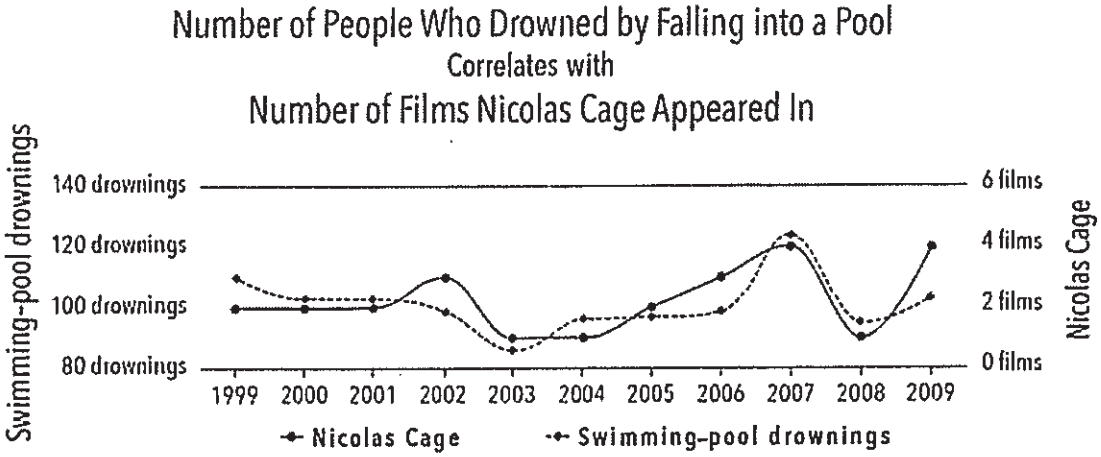
If you look carefully, you can still see a vestige* of the poor sales for last quarter: Although the line is still going up for the most recent quarter, it's going up less steeply. That's your clue that sales have dropped. But our brains aren't very good at detecting rates of change such as these (what's called the first derivative* in calculus*, a fancy name for the slope of the line). So on casual examination, it seems the company continues to do fabulously well, and (F) you've made a whole lot of consumers believe that frabezoids are still the hottest thing to have.

Plotting Things That Are Unrelated

There are so many things going on in the world that some coincidences are bound to happen. The number of green trucks* on the road may be increasing at the same time as your salary; when you were a kid, the number of shows on television may have increased with your (G). But that doesn't mean that one is causing the other. When two things are related, whether or not one causes the other, statisticians call it a correlation.

The famous adage* is that "correlation does not imply causation." In formal logic there are two formulations* of this rule:

Figure 6



1) *Post hoc** fallacy*. This is a logical fallacy that arises from thinking that just because one thing (Y) occurs after another (X), that X caused Y. People typically brush their teeth before going off to work in the morning. But brushing their teeth doesn't cause them to go to work. In this case, it is even possibly the reverse.

2) *Cum hoc** fallacy. This is a logical fallacy that arises from thinking that just because two things co-occur, one must have caused the other. To drive home the point*, Harvard Law student Tyler Vigen has written a book and a website that feature spurious* co-occurrences—correlations—such as this one (Figure 6):

(H) There are four ways to interpret this: ① drownings cause the release of new Nicolas Cage* films; ② the release of Nicolas Cage films causes drownings; ③ a third (as yet unidentified) factor causes both; or ④ they are simply unrelated and the correlation is a coincidence. If we don't separate correlation from causation, we can claim that Vigen's graph "proves" that Nic Cage was helping to prevent pool drownings, and furthermore, our best bet* is to encourage him to make fewer movies so that he can ply* his lifesaving skills as he apparently did so effectively in 2003 and 2008.

In some cases, there is no actual connection between items that are correlated —their correlation is simply coincidence. In other cases, one can find a causal link between correlated items, or at least spin a reasonable story that can spur* the acquisition of new data.

We can rule out explanation one, because it takes time to produce and release a movie, so a spike* in drownings cannot cause a spike in Nic Cage movies in the

same year. What about number two? Perhaps people become so wrapped up in the drama of Cage's films that they lose focus and drown as a consequence. It may be that the same cinematic absorption* also increases rates of automobile accidents and injuries from heavy machinery. We don't know until we analyze more data, because those are not reported here.

What about a third factor that caused both? We might guess that economic trends are driving both: A better economy leads to more investment in leisure activities—more films being made, more people going on vacation and swimming. If this is true, then neither of the two things depicted on the graph—Nic Cage films and drownings—caused the other. Instead, a third factor, the economy, led to changes in both. (I) Statisticians call this the *third factor x* explanation of correlations, and there are many cases of these.

More likely, these two are simply unrelated. If we look long enough, and hard enough, we're sure to find that two unrelated things vary with each other.

(出典：Daniel Levitin 著, A Field Guide to Lies and Statistics: A Neuroscientist on How to Make Sense of a Complex World. Penguin Books, 2018, 一部改変)

訳注

hijinks	大騒ぎ
bode well for	～にとって良い徴候である
unscrupulous	良心的でない
monkey with	いじくる
Planned Parenthood Federation of America	全米家族計画連盟
abortion	人工妊娠中絶
frabezoid	フラベゾイド（商品の名称）
cubicle	個人用小室

somber	憂うつな
vestige	痕跡
first derivative	一次導関数
calculus	微積分学
green truck	緑のトラックで、ハンバーガーやタコスなどの食べ物をケータリングしたり路上で販売したりするビジネス。2006年からカリフォルニア州で始まった。
adage	格言
formulation	明確な記述
post hoc	「事後に」を意味するラテン語
fallacy	誤った考え
cum hoc	「それとともに」を意味するラテン語
drive home the point	よく理解させる
spurious	もっともらしい
Nicolas Cage	ニコラス・ケイジ（俳優の名前）
best bet	最善の策
ply	精を出す
spur	駆り立てる
spike	(グラフや記録図の)波形の尖頭
absorption	夢中

問 1.　この文脈で下線部 (A) に最も近い意味の単語はどれか。以下の 1)-10)の中から 1 つ選び数字で答えなさい。

1) swiftly　2) mostly　3) extremely　4) desperately　5) gratefully

6) urgently　7) hardly　8) gradually　9) utterly　10) precisely

問 2.　Figure 2 について以下の設問に答えなさい。

(1) 空欄 (B-1) に当てはまる適切な語句を本文中の英単語 2 つで答えなさい。

(2) 空欄 (B-2) に当てはまる単位を答えなさい。

問 3.　Figure 3 について以下の設問に答えなさい。

(1) このグラフについて、140 字以内で説明しなさい。

(2) グラフの作成者は何を主張したいのか。80 字以内で説明しなさい。

(3) このグラフの問題点は何か。140 字以内で説明しなさい。

問 4.　空欄 (C) に入る数字を答えなさい。

問 5.　原文では下線部 (D) で述べられているグラフが Figure 5 として空欄 (E) に記載されている。解答用紙のグラフの Y 軸に適切な数字を入れ、文脈に即してデータをプロットして折れ線グラフを完成させなさい。

問 6.　下線部 (F) について、以下の設問に答えなさい。

(1) 下線部 (F) を 70 字以内で日本語に訳しなさい。なお、frabezoid はフラベゾイドと表記しなさい。

(2) どうしてそのようにすることができたのか。当初のグラフと作り直したグラフの違いをもとに、その理由を 120 字以内で説明しなさい。

問 7. 空欄 (G) について、以下の問いに答えなさい。

(1) 空欄 (G) に入るべき単語はどのような概念のものか。20 字以内で説明しなさい。

(2) 空欄 (G) に入る語として最も適切なものを以下の 1)-10)の中から 1 つ選び、数字で答えなさい。

1) radio　2) house　3) school　4) eyes　5) ears

6) fingers　7) height　8) hands　9) parents　10) father

問 8. 下線部 (H) について、以下の問いに答えなさい。

(1) 下線部 (H) を 160 字以内で日本語に訳しなさい。

(2) 下線部 (H) の①について、筆者はどのように考えているか。その理由も含めて 100 字以内で説明しなさい。

(3) 下線部 (H) の①～④のうち、どれが一番もっともらしいと考えられるか、数字で答えなさい。また、どのようにすれば確かめられるか、筆者の考えを 30 字以内で説明しなさい。

問 9. 下線部 (I) に関連して、本文に記載されていること以外で、third factor により相関関係を示す 2 つの事象について具体的な例を 1 つ挙げ、100 字以内で記しなさい。

(以下、余白)