Please put away all papers and electronic devices except for a calculator. Show enough work that it is clear how you arrived at your answer. Box/circle your final answers. Good luck!

1. (8 points) The Consumer Price Index for the year 1990 is 130.7 and for the year 2010 is 218.1. If someone needed \$35,000 to maintain a certain standard of living in 1990, how much would be needed to maintain the same standard of living in 2010?

$$ 35{,}000 \ \$_{1990} \quad \times \quad \frac{218.1 \ \$_{2010}}{130.7 \ \$_{1990}} \quad = \quad \boxed{58{,}404.74 \ \$_{2010}} $$

2. In the year 2000, a ride on the NYC subway cost \$1.50. Today, a ride costs \$2.75.

   (a) (8 points) Find the percent change in the price of a subway ride from 2000 to today.

$$ \frac{NEW - OLD}{OLD} \times 100\% \quad = \quad \frac{\$2.75 - \$1.50}{\$1.50} \times 100\% $$

$$ = \quad \frac{1.25}{1.50} \times 100\% \quad = \quad \frac{5}{6} \times 100\% \quad = \quad \boxed{83.33\% \ \text{INCREASE}} $$

   (b) (8 points) The Consumer price index (CPI) was 172.2 in the year 2000, and it is 256.8 today. Using this information, convert the cost of \$1.50 in 2000-dollars to an equivalent cost in today's dollars.

$$ 1.50 \ \$_{2000} \quad \times \quad \frac{256.8 \ \$_{TODAY}}{172.2 \ \$_{2000}} \quad = \quad \boxed{2.24 \ \$_{TODAY}} $$

   (c) (8 points) Using your answer to part (b), recalculate the percent change in the price of a subway ride from 2000 to today, adjusted for inflation.

$$ \frac{2.75 - 2.24}{2.24} \times 100\% \quad = \quad \frac{.51}{2.24} \times 100\% \quad = \quad \boxed{22.77\% \ \text{INCREASE}} $$

3. A double-blind drug versus placebo study of 103 patients suffering from tinnitus (the perception of ringing in the ears) demonstrated the effectiveness of gingko biloba extract. The gingko treatment improved the condition of all the tinnitus patients.

(a) (6 points) Is this study observational or experimental?

EXPERIMENTAL

(b) (6 points) Identify the treatment group and the control group.

TREATMENT : GINGKO BILOBA

CONTROL : PLACEBO

(c) (8 points) Explain what a "placebo" is, and why the researchers might have chosen to use one.

A PLACEBO RESEMBLES THE TREATMENT BUT LACKS THE KEY FEATURE BEING STUDIED , e.g. ACTIVE INGREDIENT .

THE RESEARCHERS MIGHT HAVE CHOSEN TO USE ONE SO THAT BOTH GROUPS BELIEVE THEY ARE RECEIVING TREATMENT , AND ANY DIFFERENCES OBSERVED BETWEEN THEM CAN BE ATTRIBUTED TO THE ACTIVE INGREDIENT , GINGKO BILOBA.

(d) (8 points) Explain what "double blind" means, and why the researchers might have chosen this method.

DOUBLE BLIND MEANS THE RESEARCHERS THEMSELVES ALSO DO NOT KNOW WHO IS IN THE TREATMENT OR CONTROL GROUPS . (IN ADDITION TO PARTICIPANTS NOT KNOWING - SINGLE BLIND)

THIS MAKES IT VERY UNLIKELY THAT PARTICIPANTS WILL LEARN WHICH GROUP THEY ARE IN.

4. Based solely on the information given, do you have reason to question the results of the following hypothetical studies? Explain your reasoning.

(a) (8 points) A study financed by a major pharmaceutical company is intended to determine whether its new cholesterol drug is more effective then similar drugs of competing companies.

SINCE THE STUDY IS FUNDED BY THE MANUFACTURER OF THE NEW DRUG, THE RESEARCHERS MAY FEEL OBLIGATED TO FIND EVIDENCE THAT IT IS MORE EFFECTIVE.
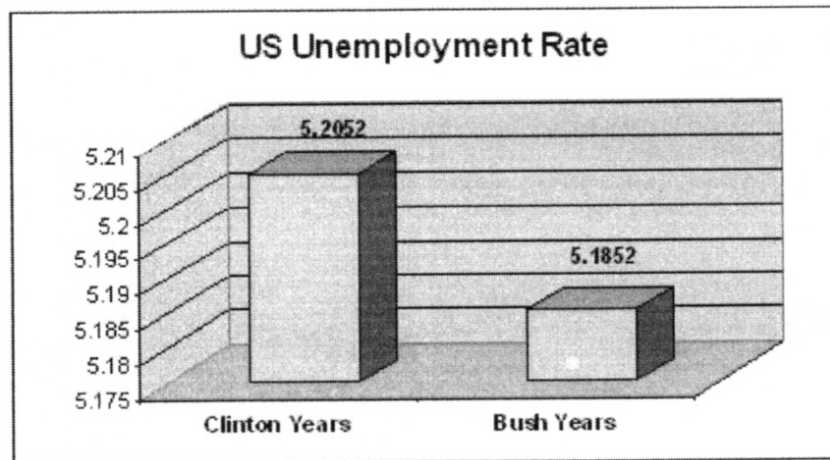
e.g. TOBACCO RESEARCH INSTITUTE

(b) (8 points) A TV talk show host asks the TV audience, "Do you support new national mileage standards for automobiles?" and asks people to vote by telephone at a toll-free number.

PRESUMABLY, THE POPULATION OF INTEREST IS ALL CITIZENS OF THIS COUNTRY. BUT THE SAMPLE IS NOT REPRESENTATIVE OF THIS POPULATION. IT SUFFERS FROM PARTICIPATION BIAS — ONLY PEOPLE WITH STRONG FEELINGS ARE LIKELY TO RESPOND. AND ALSO, PEOPLE WHO DO NOT WATCH THIS TV SHOW OR DO NOT HAVE A PHONE HAVE NO CHANCE OF BEING PART OF THIS SAMPLE.

(c) (8 points) Researchers design five survey questions to determine whether Norwegian citizens are happier than American citizens.

HAPPINESS IS DIFFICULT TO MEASURE.

5. The following figure compares the average US unemployment rate while Bill Clinton was president to the average US umemployment rate while George W. Bush was president.

US Unemployment Rate

(a) (8 points) Identify any misleading aspects of the display.

THE VERTICAL AXIS DOES NOT BEGIN AT 0.

THIS TAKES CONTEXT AWAY FROM THE DIFFERENCE BETWEEN

THE VALUES.

(b) (8 points) Redraw the display in a fairer way. (Your display does not have to be 3-dimensional.)

US UNEMPLOYMENT RATE

5.2052   5.1852

B.C.   G.W.B.