**Question 1**

1)

2)

0.052

According to one-sided hypothesis test;

failed to reject at the 5% level.

failed to reject at the 1% level.

3) I assumed that all other things being equal (*ceterius paribus*) for the other determinants of the liquor consumption over the two-year period to infer causality from the tax change to liquor consumption.

**Question 2**

1) The housing price increases by 0.223% when the distance from a recently build garbage incinerator increases by one percent. The sign of this estimate is the same as expected since the increasing distance from the incinerator (causes air pollution etc.) provides a better life quality for the family lives in. Hence, buyer will pay higher prices for a further house.

2) Regression analysis can not explain causality, it clarifies the effect of the predictive variable on the dependent variable. Thus, simple regression does not provide the causal effect of distance to incinerator completely. City’s decision on where to put the incinerator can be affected by many other factors.

3) Other factors about a house that affect its price could be the distance to hospital, supermarket, park or school, etc. Factors like air pollution and noise pollution might be correlated with distance from the incinerator.

**Question 3**

1) average salary: 865.8644 average tenure: 7.954802

Correlation coefficient measures the strength of the relationship and it takes values between -1 and 1. Since the correlation coefficient between salary and tenure is 0.1429, they have a very weak positive correlation which is negligible.

2) There are 5 CEOs who are in their first year and the longest tenure as a CEO is 37 years.

3)

Salary increases by 0.97% for every additional year of tenure.

**Question 4**

1) Each additional dollar spent seems to have a diminishing effect on the math pass rate. According to the law of diminishing marginal returns, diminishing return occurs when one parameter is fixed and limited which is the math pass rate in this case. If the variable of the process is increased, at some point it becomes less effective and eventually its return decreases for each increment. Spending additional dollars has a similar role here. As can be observed from the graph (scatterplot) of math pass rate and spending per student, each extra spending(expend) has diminishing addition on the pass rate(math10).

2)

R-squared = 0.0297 sample size = 408

R-squared shows the explanatory power of a model by calculating the rate of variability explained over total variability which is between 0 and 1. According to the acquired R-squared value, this regression model explains only 2.9% of the total variation in the math pass rate (explained by spending per student). Explanatory power of this model is low and the predictions are not going to be very good because almost 97% of the variation can not be explained by the model.

3)

The math pass rate increases by 0.1116 points when spending per student increase by one percent.

**Question 5**

1)

average salary(wage): 957.9455 average IQ: 101.2824

sample standard deviation of IQ: 15.05264

Mean of IQ is 101.28 and the sample standard deviation is 15.05264. Sample parameters are almost equal to the population parameters, differences are negligible. The reason for the difference is that we use a sample to estimate these parameters since observing the whole population is impossible. The values are very close to the population parameters because the sample size is too large (n = 935) which gives us the chance of having a good estimation.

2) The suitable regression model is level-level.

15 points of increase in IQ increases the wage by 15\*8.3 124.5 dollars.

R-squared of this model equals 0.0955 which tells that the model explains only 9.5% of the total variation which is a small fraction. Thus, IQ does not explain most of the variation in wage.

3)

Wage increases by 0.88% for every additional IQ point.

15\*0.8813.2

Wage increases by approximately 13.2% for 15 additional IQ points.

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