• The quiz is worth a total of 20 marks, with each question worth 5 marks each
• The following are simply suggested solutions

1)

Normal Good: If income for a consumer goes up and the demand curve shifts out, the good is a normal good

Externality: A non-pecuniary effect (of a transaction) that is borne by someone other than the buyer or the seller

Total Willingness to Pay: (for a particular quantity) is the area under demand curve up to that quantity. (So mathematically, total willing to pay for Q units is \( P(1) + P(2) + \ldots + P(Q) \))

Substitute Good: If the price of good B goes up and the demand curve for this good A shifts out, the two goods are substitutes

Willingness to Accept: How much you would be willing to accept to for a change in utility

2)

a: In the absence of social conventions or rules, each student will clean up only as long as the personal benefit exceeds the personal cost and will ignore the benefits to others. The high-tolerance students will clean very little. The low-tolerance students are likely not to clean all the messes that others created. Messes will probably win. The mess, like the bathroom is nonrival and nonexcludible, it is therefore a public good
b: The mess is Pareto optimal if the low-tolerance students are not able to work out any enforceable deals with the high-tolerance students over who does how much cleaning

c: The mess can be cleaned up by any trade that is voluntary and be pareto improving. This includes payments, schedules, and crazy deals between the roommates (as long as it is all voluntary, it is pareto improving)

3)

Size of Tax: We can read the size of the tax off the difference of the $D$ and $D_t$ intersections (as they are parallel): the tax is $2$

![Graph showing supply and demand curves]

Incidence on Consumer and Supplier: To find incidence on consumers and supplies, we are essentially asking, how much does the price change for consumers and suppliers after tax. We can calculate the slope of the curves to find the exact answer, however, it is completely okay to approximate the numbers. We read off $p^*$ as $1.75$ however, any answer between 1.5 and 1.9 would be acceptable. We read off $P_s$ as approximately $0.6$, anything between 0.5 and 0.7 was acceptable. so we can read off $P_d$ as $2.6$ (its just $2+0.6$). Now we can calculate the incidence.

Incidence on consumers is $P_d - P^* = 2.6 - 1.75 = \$0.85$
Incidence on suppliers is $P^* - P_s = 1.75 - 0.6 = \$1.15$

2
∆CS: We identify the old CS with $D$

We identify the new CS with $D_t$. Note, there are two ways we can do this

We identify the difference in the new CS with $D_t$ and the old CS with $D$. This is our ∆CS
4) 

The students who got this question wrong were not usually not able to identify that the Budget Constraint and Demand Curve are two very different things and are drawn on separate graphs. For simplicity, we will let the price of good 2 (shown on the vertical axis) be 1.

We first draw a budget constraint, I have labelled it as $B_1$, I have chosen the number 10 for simplicity. In the first budget constraint, we can either use up all our wage on $q_2$ and buy 10 units or spend it all on $q_1$ and get 10 units. Our wage is therefore $10. More importantly, our $p_1$ is $1$ at $B_1$.

We then increase the price of good 1 so that we can now only purchase 5, we mark this budget constraint as $B_2$. Our wage stays the same, so we can calculate the price of good 1 at $B_2$, $p_1$ at $B_2$ is $\frac{\text{wage}}{q_1^{\text{max}}} = \frac{10}{5} = 2$

These are the prices we will use, not the number we see on the vertical axis, that tells us how much we spend on the other good, not any price.

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<th></th>
<th>Wage</th>
<th>Price of Good 1</th>
<th>Price of Good 2</th>
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<tbody>
<tr>
<td>$B_1$</td>
<td>$10$</td>
<td>$1$</td>
<td>$1$</td>
</tr>
<tr>
<td>$B_2$</td>
<td>$10$</td>
<td>$2$</td>
<td>$1$</td>
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We can show all this in a Budget constraint diagram
We then add optimal Indifference curves to each of the budget constraints to find the various bundles that the consumer we represent would be purchasing. Depending on the shape of your indifference curves, you could end up with anything. In my case, with the first Budget constraint, the consumer buys 5 units of good 1 and 5.5 units of good 2. In the second Budget constraint, the consumer buys 3 units of good 1 and 5 units of good 2.

Since we are only extracting the change in demand for good 1 due to a price change, we only look at how $q_1$ changes when we change $p_1$. Therefore we can discard our information about $q_2$ at the different prices of good 1. We can summarize the information we will be using to plot D

<table>
<thead>
<tr>
<th>Price of Good 1</th>
<th>Quantity of Good 1</th>
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<tbody>
<tr>
<td>$1$</td>
<td>5 units</td>
</tr>
<tr>
<td>$2$</td>
<td>2 units</td>
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We can now draw the demand curve. Note you can not draw the demand curve on the budget constraint. First we plot the price and quantity coordinates and then draw a line showing the linear demand curve.
**Compensating Variation:** For clarity, I have removed the unnecessary information from the budget constraint. For CV, we need two budget constraints and the old utility curve. The Budget constraints are marked $B_1$ and $B_2$ and their respective Indifference curves are $I_1$ and $I_2$.

The story behind CV is that we are at the old budget curve $B_1$, and the price for a good changes, (we change the price for good 1 here) and that brings us to a new budget curve $B_2$. How much do we need to compensate the consumer so that they are just as happy as before. In other words, how much do we need to give to (or take away from) the consumer so that they go back to the same utility, $I_1$. This is answered simply by moving the new budget set $B_2$ towards the old indifference curve till it is touching it at one point, the amount we have moved the budget curve by is our compensation. In this case we move up the new budget curve up towards the old indifference curve to find CV.