Participation Quizzes

Instructions

1. **In class**, answer the quiz as best you can and submit a solution where you explain your work.
   1. Use any medium you like for this; writing by hand and taking a picture, using an equation editor, drawing equations on a tablet, coding etc. as long as it all gets pasted into a Word file.
   2. Add your answer to this word file and submit to the Participation Quizzes assignment dropbox on Avenue.
2. (Optional) **Before the next class**: improve and submit an updated solution (that also makes it into Word).
   1. Unlike the during class solution, you can learn to understand this better by working with others, getting help from office hours, use the internet, etc. as long as what you finally submit is your own work.
   2. Same expectations for format, except that where things change from your first solution you should make an effort to explain what's changed.
   3. This is due *before* the next class, because we'll *take up* the quiz at the start of the next class.
3. Reflection:
   1. Write up your brief summary of the key content points from that lecture; ideally no longer than this logistics explanation. Due with your *next* quiz submission.
4. Score:
   1. Give yourself a grade on the 5 items listed below; due with your *next* quiz submission.

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| --- |
| In-Class Solution: \_\_%/30%   1. 10%: What fraction of the quiz did you ***answer*** correctly during class? \_\_% 2. 10%: What fraction of the quiz did you have the correct ***process*** for during class? \_\_% 3. 10%: What fraction of the quiz did you put your best ***effort*** towards during class? \_\_%   Take-Home Solution (AKA Updated Solution or your In-Class Solution again, if no resubmitted one): \_\_%/40%   1. 40%: What fraction of the quiz have you ***now correctly solved***with work that's your own? → \_\_%   Reflection: \_%/30%   1. 30%: What fraction of the content have you summarized very well here in your own words? – \_\_%   Total: \_\_% |

Notes:

* If you miss attending the class in-person for any reason, you *can still* watch the lecture video and submit a Take-Home solution of the quiz question and a Reflection on the lecture, earning up to a max of 70% as long as you submit them by their normal due dates (before the start of the next class for the Take-Home solution, and before the end of it for the Reflection, which likely means you'll submit both of them by the start of that class).
* Additionally, if you miss class you can submit your Score Calculation for the previous quiz with your next quiz submission; e.g., next Take-Home solution, or within 24 hours after the last class if there are no more quizzes.
* Academic dishonesty (e.g., collaborating with someone on the individual parts, submitting work you didn't produce, incorrect scorning, etc.) will result in a zero on all quizzes.

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| Lecture 1 |

## In-Class Solution

B, because the cost per apple decreases as you buy more, which means the value of each additional apple is higher due to the lower price, therefore, the marginal net value increases.

## *(Optional)* Take-Home Solution

E. Because the marginal value of the additional apple will always be higher due to the fact that the additional apple will yield the price that has higher value than value of one apple.

## Reflection

$$

\text{Net value = [Benefit] - [Cost]}

$$

- relativity

- perspective: $\text{(Benefit - Cost)}\_{\text{client}}$

$$

\text{Benefits}\_{\text{client}} > \text{Sale Price} > \text{Cost}\_{\text{producer}}

$$

$$

\text{System Net Value =} \space \text{Benefits}\_{\text{client}} - \text{Cost}\_{\text{producer}}

$$

$$

\text{NVF = Benefits - Cost of space - Cost of time - ...}

$$

Often times the net value function should have matching unit or conversion

## Score

In-Class Solution: 30%/30%

1. 10%: What fraction of the quiz did you ***answer*** correctly during class? 10%
2. 10%: What fraction of the quiz did you have the correct process for during class? 10%
3. 10%: What fraction of the quiz did you put your best ***effort*** towards during class? 10%

Take-Home Solution (AKA Updated Solution or your In-Class Solution again, if no resubmitted one): 30%/40%

1. 40%: What fraction of the quiz have you ***now correctly solved***with work that's your own? → 30%

Reflection: 30%/30%

1. 30%: What fraction of the content have you summarized very well here in your own words? – 30%

Total: 90%

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| Lecture 2 |

## In-Class Solution

The net value of the change would be 4 dollars cheaper than the previous designed and you should change this order, since it would save 5$ from grad student time, while paying extra 1$ for more batch.

## *(Optional)* Take-Home Solution

## Reflection

> determine which options has most positive net value for the lab

$$

\text{Net value}\_{\text{Lab}} = \text{Benefits}\_{\text{Lab}} - \text{Cost}\_{\text{Lab}}

$$

$$

\begin{aligned}

NV\_P \text{(relative to purchasing)} &= NV\_P - NV\_P = 0 \\\

NV\_F \text{(relative to purchasing)} &= NV\_F - NV\_P = C\_P - C\_F \\\

NV\_{nR} \text{(relative to purchasing)} &= NV\_{nR} - NV\_P = C\_P - C\_{nR} \\\

\end{aligned}

$$

Net value is relative to given goal for objects.

## Score

In-Class Solution: 30%/30%

1. 10%: What fraction of the quiz did you ***answer*** correctly during class? 10%
2. 10%: What fraction of the quiz did you have the correct process for during class? 10%
3. 10%: What fraction of the quiz did you put your best ***effort*** towards during class? 10%

Take-Home Solution (AKA Updated Solution or your In-Class Solution again, if no resubmitted one): 40%/40%

1. 40%: What fraction of the quiz have you ***now correctly solved***with work that's your own? → 10%

Reflection: 30%/30%

1. 30%: What fraction of the content have you summarized very well here in your own words? – 30%

Total: 100%

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| Lecture 3 |

## In-Class Solution

## *(Optional)* Take-Home Solution

Since the grade outweighs the money and satisfaction of eating, we will use percentage as the conversion factor rate.

Choose option 3, because the opportunity cost of eating for 20 minutes is 10% marks, whereas studying for 20 minutes only gives you a 4% increase, gives you a net 6% increase in opportunity cost.

Option 3 outweighs option 2 since it only gives you a 2% increase in marks.

1 and 4 are nonesense, since 1 you will actually only get a 2% increase.

## Reflection

Relevant to economic analysis process must:

- explicitly incorporated into NVF by giving it \_conversion factor\_

- included as a hard constraints

> conversion factor: convert benefit and costs into common units

Determinants:

- time, cost of labour, opportunity cost

- marginal NV and quantity-dependent conversion Factors

### cost of labours.

- wages

- materials

- overhead: HR, tools/equipment

### cost of time.

- overtime shifts, extra works or outsourcing?

- additional factor: happiness, time already spent (context: not all time is equal)

### opportunity cost.

> negative impact from having to give up the best alternatives

> [!important]

> Should always consider this when going forward with a project.

- cost of those forgone alternatives in \_conversion units\_

- costs for not solving other problems

- compare NV for solving the other one.

> Double counting: mutually exclusive alternatives that is considered as double-counting in calculating NVF.

### conversion function.

- quantity-dependent conversion Factors

$$

NV\_{\text{oranges}}(x) = B\_{\text{oranges}}(x) - C\_{\text{oranges}}(x)

$$

### marginal value change.

> extra net value obtained for one more item

$$

\Delta NV = NV(x+1) - NV(x)

$$

## Score

In-Class Solution: 0%/30%

1. 10%: What fraction of the quiz did you ***answer*** correctly during class? \_\_%
2. 10%: What fraction of the quiz did you have the correct process for during class? \_\_%
3. 10%: What fraction of the quiz did you put your best ***effort*** towards during class? \_\_%

Take-Home Solution (AKA Updated Solution or your In-Class Solution again, if no resubmitted one): 40%/40%

1. 40%: What fraction of the quiz have you ***now correctly solved***with work that's your own? → 40%

Reflection: 30%/30%

1. 30%: What fraction of the content have you summarized very well here in your own words? – 30%

Total: 70%

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| Lecture 4 |

## In-Class Solution

The average health costs from $PM\_{2.5}$ per kWh is =166e9/3.5e6\*6000/640e9=$0.0004446429 per kWh

## *(Optional)* Take-Home Solution

## Reflection

Environmental impacts and ethical considerations must be required to put into conversion factors. These externalities will determine whether it impacts positively and negatively on the end users. It is important to implement and consider which upgrades to be made through risk analysis. We can use tools like F-N graph to consider the risks of an implementation regarding life.

What does it mean to design safe structure and resource allocation is important to determine for safe design.

## Score

In-Class Solution: 30%/30%

1. 10%: What fraction of the quiz did you ***answer*** correctly during class? 10%
2. 10%: What fraction of the quiz did you have the correct process for during class? 10%
3. 10%: What fraction of the quiz did you put your best ***effort*** towards during class? 10%

Take-Home Solution (AKA Updated Solution or your In-Class Solution again, if no resubmited one): 40%/40%

1. 40%: What fraction of the quiz have you ***now correctly solved***with work that's your own? → \_\_%

Reflection: 30%/30%

1. 30%: What fraction of the content have you summarized very well here in your own words? – 30%

Total: 100%

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| Lecture 5 |

## In-Class Solution

Option c because it involves applying technical knowledge to solve a problem related to the design of the problem.

## *(Optional)* Take-Home Solution

## Reflection

> technical analysis: Using science to determine how variables are related in order to draw conclusions in engineering-relevant context

- Licensing is not discipline-specific

> engineering design:

> - making decisions: \_on the basis of engineering principles\_

> - create plans: \_for someone to create/modify something\_

> - benefit of humans

### terms.

1. Decision variables:

- could change about the design

2. Performance parameters

- describes how well the realised design works that is relevant to the end users

- can't control performance parameters directly

### optimum engineering design.

1. use \*\*technical analysis\*\* to determine decision variables

2. write \*\*NVF\*\* in terms of \_decision variables\_

3. use \*\*optimisation methods\*\* to determine

- optimum set of decision variables

- corresponding value of NVF

- sensitive the optimum set and resulting NVF are to changes in decision variables and other parameters

### validity and assumptions:

- push to one extreme

## Score

In-Class Solution: \_\_%/30%

1. 10%: What fraction of the quiz did you ***answer*** correctly during class? \_\_%
2. 10%: What fraction of the quiz did you have the correct process for during class? \_\_%
3. 10%: What fraction of the quiz did you put your best ***effort*** towards during class? 10%

Take-Home Solution (AKA Updated Solution or your In-Class Solution again, if no resubmitted one): \_\_%/40%

1. 40%: What fraction of the quiz have you ***now correctly solved***with work that's your own? → \_\_%

Reflection: 20%/30%

1. 30%: What fraction of the content have you summarized very well here in your own words? – 20%

Total: \_\_%

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| Lecture 6 |

## In-Class Solution

## *(Optional)* Take-Home Solution

## Reflection

## Score

In-Class Solution: \_\_%/30%

1. 10%: What fraction of the quiz did you ***answer*** correctly during class? \_\_%
2. 10%: What fraction of the quiz did you have the correct process for during class? \_\_%
3. 10%: What fraction of the quiz did you put your best ***effort*** towards during class? \_\_%

Take-Home Solution (AKA Updated Solution or your In-Class Solution again, if no resubmitted one): \_\_%/40%

1. 40%: What fraction of the quiz have you ***now correctly solved***with work that's your own? → \_\_%

Reflection: \_%/30%

1. 30%: What fraction of the content have you summarized very well here in your own words? – \_\_%

Total: \_\_%

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| Lecture 7 |

## In-Class Solution

## *(Optional)* Take-Home Solution

## Reflection

## Score

In-Class Solution: \_\_%/30%

1. 10%: What fraction of the quiz did you ***answer*** correctly during class? \_\_%
2. 10%: What fraction of the quiz did you have the correct process for during class? \_\_%
3. 10%: What fraction of the quiz did you put your best ***effort*** towards during class? \_\_%

Take-Home Solution (AKA Updated Solution or your In-Class Solution again, if no resubmitted one): \_\_%/40%

1. 40%: What fraction of the quiz have you ***now correctly solved***with work that's your own? → \_\_%

Reflection: \_%/30%

1. 30%: What fraction of the content have you summarized very well here in your own words? – \_\_%

Total: \_\_%

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| Lecture 8 |

## In-Class Solution

## *(Optional)* Take-Home Solution

## Reflection

## Score

In-Class Solution: \_\_%/30%

1. 10%: What fraction of the quiz did you ***answer*** correctly during class? \_\_%
2. 10%: What fraction of the quiz did you have the correct process for during class? \_\_%
3. 10%: What fraction of the quiz did you put your best ***effort*** towards during class? \_\_%

Take-Home Solution (AKA Updated Solution or your In-Class Solution again, if no resubmitted one): \_\_%/40%

1. 40%: What fraction of the quiz have you ***now correctly solved***with work that's your own? → \_\_%

Reflection: \_%/30%

1. 30%: What fraction of the content have you summarized very well here in your own words? – \_\_%

Total: \_\_%

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| Lecture 9 |

## In-Class Solution

## *(Optional)* Take-Home Solution

## Reflection

## Score

In-Class Solution: \_\_%/30%

1. 10%: What fraction of the quiz did you ***answer*** correctly during class? \_\_%
2. 10%: What fraction of the quiz did you have the correct process for during class? \_\_%
3. 10%: What fraction of the quiz did you put your best ***effort*** towards during class? \_\_%

Take-Home Solution (AKA Updated Solution or your In-Class Solution again, if no resubmitted one): \_\_%/40%

1. 40%: What fraction of the quiz have you ***now correctly solved***with work that's your own? → \_\_%

Reflection: \_%/30%

1. 30%: What fraction of the content have you summarized very well here in your own words? – \_\_%

Total: \_\_%

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| Lecture 10 |

## In-Class Solution

## *(Optional)* Take-Home Solution

## Reflection

## Score

In-Class Solution: \_\_%/30%

1. 10%: What fraction of the quiz did you ***answer*** correctly during class? \_\_%
2. 10%: What fraction of the quiz did you have the correct process for during class? \_\_%
3. 10%: What fraction of the quiz did you put your best ***effort*** towards during class? \_\_%

Take-Home Solution (AKA Updated Solution or your In-Class Solution again, if no resubmitted one): \_\_%/40%

1. 40%: What fraction of the quiz have you ***now correctly solved***with work that's your own? → \_\_%

Reflection: \_%/30%

1. 30%: What fraction of the content have you summarized very well here in your own words? – \_\_%

Total: \_\_%

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| Lecture 11 |

## In-Class Solution

## *(Optional)* Take-Home Solution

## Reflection

## Score

In-Class Solution: \_\_%/30%

1. 10%: What fraction of the quiz did you ***answer*** correctly during class? \_\_%
2. 10%: What fraction of the quiz did you have the correct process for during class? \_\_%
3. 10%: What fraction of the quiz did you put your best ***effort*** towards during class? \_\_%

Take-Home Solution (AKA Updated Solution or your In-Class Solution again, if no resubmitted one): \_\_%/40%

1. 40%: What fraction of the quiz have you ***now correctly solved***with work that's your own? → \_\_%

Reflection: \_%/30%

1. 30%: What fraction of the content have you summarized very well here in your own words? – \_\_%

Total: \_\_%

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| Lecture 12 |

## In-Class Solution

## *(Optional)* Take-Home Solution

## Reflection

## Score

In-Class Solution: \_\_%/30%

1. 10%: What fraction of the quiz did you ***answer*** correctly during class? \_\_%
2. 10%: What fraction of the quiz did you have the correct process for during class? \_\_%
3. 10%: What fraction of the quiz did you put your best ***effort*** towards during class? \_\_%

Take-Home Solution (AKA Updated Solution or your In-Class Solution again, if no resubmitted one): \_\_%/40%

1. 40%: What fraction of the quiz have you ***now correctly solved***with work that's your own? → \_\_%

Reflection: \_%/30%

1. 30%: What fraction of the content have you summarized very well here in your own words? – \_\_%

Total: \_\_%

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| Lecture 13 |

## In-Class Solution

## *(Optional)* Take-Home Solution

## Reflection

## Score

In-Class Solution: \_\_%/30%

1. 10%: What fraction of the quiz did you ***answer*** correctly during class? \_\_%
2. 10%: What fraction of the quiz did you have the correct process for during class? \_\_%
3. 10%: What fraction of the quiz did you put your best ***effort*** towards during class? \_\_%

Take-Home Solution (AKA Updated Solution or your In-Class Solution again, if no resubmitted one): \_\_%/40%

1. 40%: What fraction of the quiz have you ***now correctly solved***with work that's your own? → \_\_%

Reflection: \_%/30%

1. 30%: What fraction of the content have you summarized very well here in your own words? – \_\_%

Total: \_\_%

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| Lecture 14 |

## In-Class Solution

## *(Optional)* Take-Home Solution

## Reflection

## Score

In-Class Solution: \_\_%/30%

1. 10%: What fraction of the quiz did you ***answer*** correctly during class? \_\_%
2. 10%: What fraction of the quiz did you have the correct process for during class? \_\_%
3. 10%: What fraction of the quiz did you put your best ***effort*** towards during class? \_\_%

Take-Home Solution (AKA Updated Solution or your In-Class Solution again, if no resubmitted one): \_\_%/40%

1. 40%: What fraction of the quiz have you ***now correctly solved***with work that's your own? → \_\_%

Reflection: \_%/30%

1. 30%: What fraction of the content have you summarized very well here in your own words? – \_\_%

Total: \_\_%

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| Lecture 15 |

## In-Class Solution

## *(Optional)* Take-Home Solution

## Reflection

## Score

In-Class Solution: \_\_%/30%

1. 10%: What fraction of the quiz did you ***answer*** correctly during class? \_\_%
2. 10%: What fraction of the quiz did you have the correct process for during class? \_\_%
3. 10%: What fraction of the quiz did you put your best ***effort*** towards during class? \_\_%

Take-Home Solution (AKA Updated Solution or your In-Class Solution again, if no resubmitted one): \_\_%/40%

1. 40%: What fraction of the quiz have you ***now correctly solved***with work that's your own? → \_\_%

Reflection: \_%/30%

1. 30%: What fraction of the content have you summarized very well here in your own words? – \_\_%

Total: \_\_%

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| Lecture 16 |

## In-Class Solution

## *(Optional)* Take-Home Solution

## Reflection

## Score

In-Class Solution: \_\_%/30%

1. 10%: What fraction of the quiz did you ***answer*** correctly during class? \_\_%
2. 10%: What fraction of the quiz did you have the correct process for during class? \_\_%
3. 10%: What fraction of the quiz did you put your best ***effort*** towards during class? \_\_%

Take-Home Solution (AKA Updated Solution or your In-Class Solution again, if no resubmitted one): \_\_%/40%

1. 40%: What fraction of the quiz have you ***now correctly solved***with work that's your own? → \_\_%

Reflection: \_%/30%

1. 30%: What fraction of the content have you summarized very well here in your own words? – \_\_%

Total: \_\_%

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| Lecture 17 |

## In-Class Solution

## *(Optional)* Take-Home Solution

## Reflection

## Score

In-Class Solution: \_\_%/30%

1. 10%: What fraction of the quiz did you ***answer*** correctly during class? \_\_%
2. 10%: What fraction of the quiz did you have the correct process for during class? \_\_%
3. 10%: What fraction of the quiz did you put your best ***effort*** towards during class? \_\_%

Take-Home Solution (AKA Updated Solution or your In-Class Solution again, if no resubmitted one): \_\_%/40%

1. 40%: What fraction of the quiz have you ***now correctly solved***with work that's your own? → \_\_%

Reflection: \_%/30%

1. 30%: What fraction of the content have you summarized very well here in your own words? – \_\_%

Total: \_\_%

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| Lecture 18 |

## In-Class Solution

## *(Optional)* Take-Home Solution

## Reflection

## Score

In-Class Solution: \_\_%/30%

1. 10%: What fraction of the quiz did you ***answer*** correctly during class? \_\_%
2. 10%: What fraction of the quiz did you have the correct process for during class? \_\_%
3. 10%: What fraction of the quiz did you put your best ***effort*** towards during class? \_\_%

Take-Home Solution (AKA Updated Solution or your In-Class Solution again, if no resubmitted one): \_\_%/40%

1. 40%: What fraction of the quiz have you ***now correctly solved***with work that's your own? → \_\_%

Reflection: \_%/30%

1. 30%: What fraction of the content have you summarized very well here in your own words? – \_\_%

Total: \_\_%

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| Lecture 19 |

## In-Class Solution

## *(Optional)* Take-Home Solution

## Reflection

## Score

In-Class Solution: \_\_%/30%

1. 10%: What fraction of the quiz did you ***answer*** correctly during class? \_\_%
2. 10%: What fraction of the quiz did you have the correct process for during class? \_\_%
3. 10%: What fraction of the quiz did you put your best ***effort*** towards during class? \_\_%

Take-Home Solution (AKA Updated Solution or your In-Class Solution again, if no resubmitted one): \_\_%/40%

1. 40%: What fraction of the quiz have you ***now correctly solved***with work that's your own? → \_\_%

Reflection: \_%/30%

1. 30%: What fraction of the content have you summarized very well here in your own words? – \_\_%

Total: \_\_%

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| Lecture 20 |

## In-Class Solution

## *(Optional)* Take-Home Solution

## Reflection

## Score

In-Class Solution: \_\_%/30%

1. 10%: What fraction of the quiz did you ***answer*** correctly during class? \_\_%
2. 10%: What fraction of the quiz did you have the correct process for during class? \_\_%
3. 10%: What fraction of the quiz did you put your best ***effort*** towards during class? \_\_%

Take-Home Solution (AKA Updated Solution or your In-Class Solution again, if no resubmitted one): \_\_%/40%

1. 40%: What fraction of the quiz have you ***now correctly solved***with work that's your own? → \_\_%

Reflection: \_%/30%

1. 30%: What fraction of the content have you summarized very well here in your own words? – \_\_%

Total: \_\_%

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| Lecture 21 |

## In-Class Solution

## *(Optional)* Take-Home Solution

## Reflection

## Score

In-Class Solution: \_\_%/30%

1. 10%: What fraction of the quiz did you ***answer*** correctly during class? \_\_%
2. 10%: What fraction of the quiz did you have the correct process for during class? \_\_%
3. 10%: What fraction of the quiz did you put your best ***effort*** towards during class? \_\_%

Take-Home Solution (AKA Updated Solution or your In-Class Solution again, if no resubmitted one): \_\_%/40%

1. 40%: What fraction of the quiz have you ***now correctly solved***with work that's your own? → \_\_%

Reflection: \_%/30%

1. 30%: What fraction of the content have you summarized very well here in your own words? – \_\_%

Total: \_\_%