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Signed

Missing Communication

Conclusion

# Byzantine Generals Problem

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Introduction

Generals

Oral Solution

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- A. All loyal generals decide upon the same plan of action.
- B. A small number of traitors cannot cause the loyal generals to adopt a bad plan.

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Conclusion

 Condition A is met by having the generals use the same method of decision making. Western Carolina University

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I hree Generals

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- Condition A is met by having the generals use the same method of decision making.
- •. Condition B is met by having the generals use a robust decision making method.

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Conclusion

1. Every loyal general must obtain the same information  $v_1, ..., v_n$ .

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- 1. Every loyal general must obtain the same information  $v_1, ..., v_n$ .
- 2. If the  $i^{th}$  general is loyal, then the value that they sends must be used by every loyal general as the value of  $v_i$ .

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- 1. Every loyal general must obtain the same information  $v_1, ..., v_n$ .
- 2. If the  $i^{th}$  general is loyal, then the value that they sends must be used by every loyal general as the value of  $v_i$ .

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Conclusion

- 1. Every loyal general must obtain the same information  $v_1, ..., v_n$ .
- 2. If the  $i^{th}$  general is loyal, then the value that they sends must be used by every loyal general as the value of  $v_i$ .

## Condition 1 can be rewritten as:

1'. For every i, any two loyal generals use the same value of  $v_i$ .

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Conclusio

To help ensure that Condition A and Condition B are met, we need to meet two other conditions:

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Conclusior

To help ensure that Condition A and Condition B are met, we need to meet two other conditions:

IC1. All loyal lieutenants obey the same order.

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To help ensure that Condition A and Condition B are met, we need to meet two other conditions:

- IC1. All loyal lieutenants obey the same order.
- IC2. If the commander is loyal, then every loyal lieutenant obeys the order they sends.

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•. Loyal generals cannot take a value  $v_i$  at face value.

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- •. Loyal generals cannot take a value  $v_i$  at face value.
- •. Condition 1' and Condition 2 are both contingent on a single  $v_i$  sent by the  $i^{th}$  general.

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## Byzantine Generals Problem

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## Byzantine Generals Problem

A commanding general must send an order to their n-1 lieutenants such that:

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## Byzantine Generals Problem

A commanding general must send an order to their n-1 lieutenants such that:

IC1. All loyal lieutenants obey the same order.

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## Byzantine Generals Problem

A commanding general must send an order to their n-1 lieutenants such that:

- IC1. All loyal lieutenants obey the same order.
- IC2. If the commander is loyal, then every loyal lieutenant obeys the order they sends.

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## Signed Solution

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## References

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