

## Exercise I Topics

- Bio recap
- Data acquisition
- Data processing
- Data formats


## Evaluation Exercise I

Data Management for Digital Health, Summer 2017

## Exercise I

## 25 Questions 35 Points

33 Students<br>32 Passed

## Average score 31.55 / 90\%

Average time 84min


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## 6. The following nucleotide sequence TCA-CCT-GTA-TAG-ATA is given.

■ ...and we assume that it is read from left to right and the reading frame starts at the first position. Which of the following statements is correct?
$\square$ It contains one stop codon
$\square$ It contains one start codon
$\square$ It contains the amino acid leucine
$\square$ It does not contain the amino acid lysine


## TCA CCT GTA TAG ATA



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## 8. Why are longitudinal data important for health research?

■ They are not important at all
■ They document equidistant measurements
■ They are used as foundation for plotting linear graphs

- They provide multiple measurements of the same parameter across time



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## 9. In the following, please consider sensor data, such as acquired on intensive care units in hospitals.

- Which of the following statements are correct?
$\square$ Each measurement has a relatively small data size but they occur at a high frequency
$\square$ Recording sensor data over time provides longitudinal data for the specific measurement
$\square$ Sensor data are generated at a frequency of $100-200 \mathrm{~Hz}$
$\square$ Sensor data are depicted as linear plots

10. Which of the following steps is crucial for current low-cost high-throughput sequencing:

- Nucleotide saturation
- Amplification of DNA fragments
- Gene alignment
- Indexing of base pairs


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## 22. Please select all correct statements for Burrows-Wheeler Transform (BWT)

- BWT is a compression schema for nucleotide sequences
- BWT is a bijective operation

■ BWT creates from a given input string a reordered output string more suitable for data compression

■ BWT cannot be used for DNA sequences as their alphabet is too limited to benefit from data compression Transform

| S |  | E | S |  |  |  | E | R |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| R |  | E | R |  |  |  | E | S |
| v |  | E | V |  |  |  | E | \# |
| * |  | R | * |  |  |  | R | E |
| E | Sort | R | E |  |  | Sort | R | V |
| E |  | S | E |  |  |  | S | E |
| R |  | V | R |  |  |  | V | E |
| \# |  | * | \# |  |  |  | * | R |
| E |  | \# | E |  |  |  | \# | * |


| S | E | S |  | E | R | R |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| R | E | V |  | E | S | E |
| V | E | \# |  | E | \# | * |
| * | R | E |  | R | E | V |
| E | R | R | Sort | R | V | R |
| E | S | E |  | S | E | S |
| R | V | R |  | V | E | \# |
| \# | * | R |  | * | R | E |
| E | \# | * |  | \# | * | R |


| S | E | R | R |
| :---: | :---: | :---: | :---: |
| R | E | S | E |
| V | E | \# | * |
| * | R | E | V |
| E | R | V | R |
| E | S | E | S |
| R | V | E | \# |
| \# | * | R | E |
| E | \# | * | R |


| $E$ | $R$ | $V$ | $R$ |
| :--- | :--- | :--- | :--- |
| $E$ | $S$ | $E$ | $S$ |
| $E$ | $\#$ | $*$ | $R$ |
| $R$ | $E$ | $S$ | $E$ |
| $R$ | $V$ | $E$ | $\#$ |
| S | $E$ | $R$ | $R$ |
| $V$ | $E$ | $\#$ | $*$ |
| * | $R$ | $E$ | $V$ |
| $\#$ | $*$ | $R$ | $E$ |

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| S | E | R | V | R |  | E | R | $V$ | E |  | \# |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| R | E | S | E | S |  | E | S | E | R |  | R |
| V | E | \# | * | R |  | E | \# | * | R |  | E |
| * | R | E | S | E |  | R | E | S | E |  | S |
| E | R | V | E | \# | Sort | R | $V$ | E | \# |  | * |
| E | S | E | R | R |  | S | E | R | V |  | R |
| R | V | E | \# | * |  | V | E | \# | * |  | R |
| \# | * | R | E | V |  | * | R | E | S |  | E |
| E | \# | * | R | E |  | \# | * | R | E |  | V |

BWT


BWT

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| S | E | R | V | E | \# | * |  | E | R | $V$ | E |  | \# | * | R |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| R | E | S | E | R | $V$ | R |  | E | S | E | R |  | V | E | \# |
| V | E | \# | * | R | E | $V$ |  | E | \# | * | R | R E | E | S | E |
| * | R | E | S | E | R | R |  | R | E | S | E |  | R | V | R |
| E | R | $V$ | E | \# | * | R | $\xrightarrow{\text { Sort }}$ | R | V | E | \# |  | * | R | E |
| E | S | E | R | V | E | \# |  | S | E | R | V |  | E | \# | * |
| R | V | E | \# | * | R | E |  | V | E | \# |  |  | R | E | V |
| \# | * | R | E | S | E | S |  | * | R | E | S | S | E | R | R |
| E | \# | * | R | E | S | E |  | \# | * | R |  |  | S | E | S |


| S | $E$ | $R$ | $V$ | $E$ | $\#$ | $*$ | $R$ |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- |
| $R$ | $E$ | $S$ | $E$ | $R$ | $V$ | $E$ | $\#$ |
| $V$ | $E$ | $\#$ | $*$ | $R$ | $E$ | $S$ | $E$ |
| $*$ | $R$ | $E$ | $S$ | $E$ | $R$ | $V$ | $R$ |
| $E$ | $R$ | $V$ | $E$ | $\#$ | $*$ | $R$ | $E$ |
| $E$ | $S$ | $E$ | $R$ | $V$ | $E$ | $\#$ | $*$ |
| $R$ | $V$ | $E$ | $\#$ | $*$ | $R$ | $E$ | $V$ |
| $\#$ | $*$ | $R$ | $E$ | $S$ | $E$ | $R$ | $R$ |
| $E$ | $\#$ | $*$ | $R$ | $E$ | $S$ | $E$ | $S$ |

BWT


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| S | E | R | V | E | \# | * | R | E |  | E | R | V | E |  | * | R | E | V |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| R | E | S | E | R | V | E | \# | * |  | E | S | E | R |  | E | \# | * | R |
| V | E | \# | * | R | E | S | E | S |  | E | \# | * | R |  | S | E | R | R |
| * | R | E | S | E | R | V | E | \# |  | R | E | S | E |  | $V$ | E | \# | * |
| E | R | V | E | \# | * | R | E | V | Sort | R | V | E | \# |  | R | E | S | E |
| E | S | E | R | V | E | \# | * | R |  | S | E | R | V |  | \# | * | R | E |
| R | V | E | \# | * | R | E | S | E |  | V | E | \# | * |  | E | S | E | S |
| \# | * | R | E | S | E | R | V | R |  | * | R | E | S |  | R | $V$ | E | \# |
| E | \# | * | R | E | S | E | R | R |  | \# |  | R | E |  | E | R | V | R |

BWT

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- *RESERVE\#
- *REVERES\#
- *REVERSE\#

■ *SEVERER\#

| $E$ | $R$ | $V$ | $E$ | $\#$ | $*$ | $R$ | $E$ | $V$ |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| $E$ | $S$ | $E$ | $R$ | $V$ | $E$ | $\#$ | $*$ | $R$ |
| $E$ | $\#$ | $*$ | $R$ | $E$ | $S$ | $E$ | $R$ | $R$ |
| $R$ | $E$ | $S$ | $E$ | $R$ | $V$ | $E$ | $\#$ | $*$ |
| $R$ | $V$ | $E$ | $\#$ | $*$ | $R$ | $E$ | $S$ | $E$ |
| S | $E$ | $R$ | $V$ | $E$ | $\#$ | $*$ | $R$ | $E$ |
| $V$ | $E$ | $\#$ | $*$ | $R$ | $E$ | $S$ | $E$ | $S$ |
| $*$ | $R$ | $E$ | $S$ | $E$ | $R$ | $V$ | $E$ | $\#$ |
| $\#$ | $*$ | $R$ | $E$ | $S$ | $E$ | $R$ | $V$ | $R$ |

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