Montana State University Computer Science Department

Graduating Senior Exam

Academic Year 2021-2022, 80 minutes.

Your performance helps us assess how well we are meeting our stated outcomes for our undergraduate students. To pass this exam, spend a minimum of 30 minutes to answer the questions and make your best attempt to answer each question correctly. We will use this information to make improvements to our program.

Name _____

Question 1: Provide an analysis of the running time of MERGESORT on an unordered array of size n. **Include the recurrence relation** and provide the solution to it.

Recurrence relation:

Solution to recurrence relation, e.g. O(n):

Question 2: **Identify and explain** the running time of QUICKSORT with respect to its worst case, best case and average case behavior on input arrays of size n.

Best case running time, e.g. O(n):

Best case explanation:

Average case running time, e.g. O(n):

Average case explanation:

Worst case running time, e.g. O(n):

Worst case explanation:

Question 3: Explain the GNU General Public License, and **discuss two issues** with it.

GNU General Public License explanation:

Issue 1:

Issue 2:

Question 4: Identify three rules from a Professional Code of Conduct that apply to computing professionals.

Rule 1:

Rule 2:

Rule 3:

Question 5: **Define outsourcing** and **discuss two issues** relating to it.

Definition of outsourcing:

Issue 1:

Issue 2:

Question 6: Discuss **three ways** that computing impacts individuals and society in either a positive or negative manner.

Impact 1 (can be positive or negative):

Impact 2 (can be positive or negative):

Impact 3 (can be positive or negative):

Question 7: List any unpaid community service (e.g. the Gallatin Valley Food Bank or coaching), unpaid university service (e.g. Engineering Ambassadors or Swing Cats) or unpaid departmental service (e.g. AWC or ACM) that you were involved with during your time at MSU. For each activity, (1) **estimate** the total amount of time that you spent, (2) **describe** briefly your main activities and (3) **list** any officer positions that you held.

Organization	*Total Hours Spent (estimate)*	*Main Activities*	*Officer Positions (if any)*

Question 8: During your time at MSU, list any major non-classroom, non-paid activities that you engaged in to help prepare for your computer science career. For example, you might have taught yourself a programming language or attended a workshop on a CS topic. For each activity, **estimate the number of hours spent**.

Non-paid, non-classroom learning activity	*Total hours spent (estimate)*

Question 9: Name the most sophisticated Integrated Development Environment (IDE) that you use and describe three nontrivial features it has.

Name of most sophisticated IDE:

Non-trivial feature 1:

Non-trivial feature 2:

Non-trivial feature 3:

Question 10: Name the most sophisticated version control system that you use and describe three nontrivial features it has.

Name of most sophisticated version control system:

Non-trivial feature 1:

Non-trivial feature 2:

Non-trivial feature 3: