

CPSC 101  
2008/2009 Winter term 2  
Midterm Exam  
February 26<sup>th</sup>, 2009

Name: \_\_\_\_\_ **SAMPLE SOLUTIONS** \_\_\_\_\_

Student Number: \_\_\_\_\_

Signature: \_\_\_\_\_

- You have **65 minutes** to write the **8 questions** on this examination.
- A total of 50 marks are available. **You may want to complete what you consider to be the easiest questions first!**
- Justify all of your answers.
- No notes or electronic equipment (including calculators) are allowed.
- Keep your answers short. If you run out of space for a question, you have written too much.
- The number in square brackets to the right of the question indicates the number of marks allocated to that question.
- Good luck!

Question	Marks	Max
1		4
2		6
3		8
4		5
5		5
6		8
7		5
8		9
Total		50

UNIVERSITY REGULATIONS:

- Each candidate should be prepared to produce, upon request, a UBC card for identification.
- Candidates are not permitted to ask questions of the invigilators, except in cases of supposed errors or ambiguities in examination questions.
- No candidate shall be permitted to enter the examination room after the expiration of one half hour from the scheduled starting time or to leave during the first half hour of the examination.
- CAUTION: candidates suspected of any of the following, or similar, dishonest practices shall be immediately dismissed from the examination and shall be liable to disciplinary action.
  1. Having at the place of writing, any books, papers or memoranda, calculators, computers, sound or image players/recorders/transmitters (including telephones), or other memory aid devices, other than those authorised by the examiners.
  2. Speaking or communicating with other candidates.
  3. Purposely exposing written papers to the view of other candidates or imaging devices.The plea of accident or forgetfulness shall not be received.
- Candidates must not destroy or mutilate any examination material; must hand in all examination papers; and must not take any examination material from the examination room without permission of the invigilator.
- Candidates must follow any additional examination rules or directions communicated by the instructor or invigilator.

1. Using the concepts we learned in the HCI unit
  - a. explain why computer programs often turn the mouse cursor to an hourglass when they are performing a slow operation. **[2 marks]**

The computer programs often show an hourglass when performing a long operation as a feedback mechanism. It is important to give the user feedback so that he/she understands that the computer has received the input and is performing some work.

- b. explain why a driver may accidentally turn on the windshield wipers instead of the turn signal when she's driving a car that's unfamiliar to her. **[2 marks]**

A driver is conditioned to use her own car. This means that she may automatically reach for a particular control (button, knob, etc) when she wants to perform a particular task. This conditioning negatively transfers to the unfamiliar car, so she may be automatically reaching for the wrong control.

**The space below is intentionally blank.**

2. Answer the following questions about networking.

- a. Below is the “broken” party protocol algorithm that we discussed in class. What problem(s) would arise if it was used for broadcast communication? [2 marks]

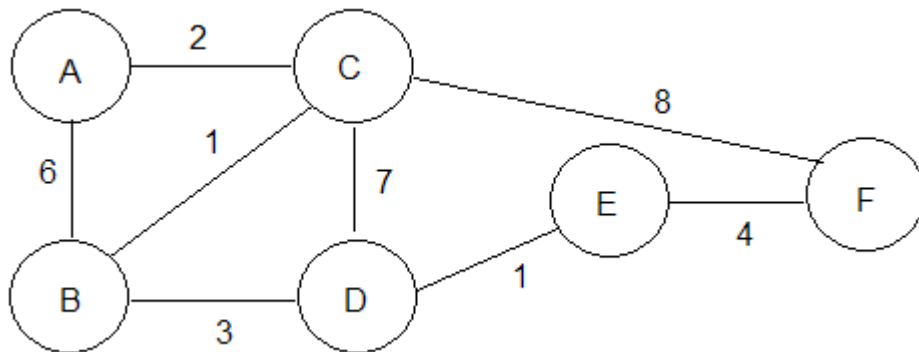
1. **repeat**
2.   listen to channel
3.   **if** channel is busy
4.    **then** wait for a fixed number of time steps
5.    **else** send packet on channel (and you are done)
6. **until** you are done

**This algorithm is broken because the sender does not listen to ensure that its packets are received.**

- b. Why do we use domain names, when IP addresses would be sufficient? [2 mark]

**IP addresses consist of four numbers, each between 0-255. It is very difficult for humans to use IP addresses because of their format. We use domain names because they are much easier for humans to remember.**

- c. Would route would a message take in the below network from node E to node A using a point-to-point routing algorithm? Show your work for part marks. [2 marks]



**E – D – B – C – A for a total cost of 7**

3. Write all of the HTML that is necessary to create a webpage with **[8 marks]**

- Computer Science as the title
- A table with 2 rows
- A link to [www.cs.ubc.ca](http://www.cs.ubc.ca)
- An image that links to a file called myPage.html. The image file is me.jpg and is in the same directory as the file you're creating. The file myPage.html is saved one directory above the file that you are creating.

```
<html>

<head>
  <title>Computer Science</title>
</head>

<body>
  A link to <a href="http://www.cs.ubc.ca">UBC's Computer Science
department</a>.

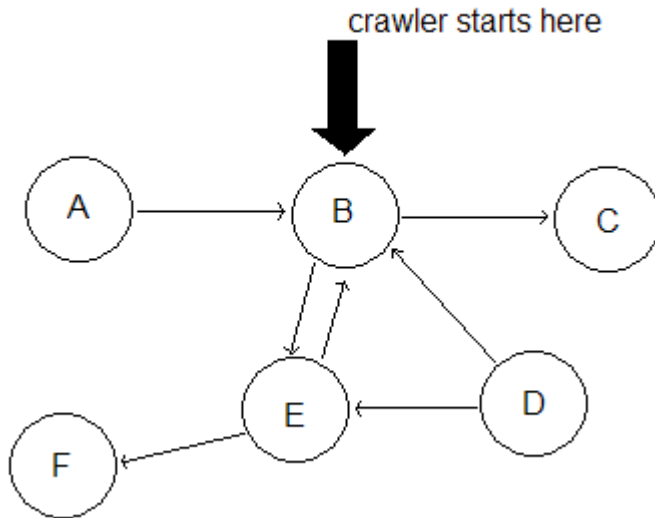
  <table>
    <tr>
      <td> Row 1 </td>
    </tr>
    <tr>
      <td> Row 2 </td>
    </tr>
  </table>

  <a href="../myPage.html"></a>

</body>

</html>
```

4. Consider this graph representing webpages. Each node (circle) represents a webpage and each edge (arrow) represents a link.



- a. Which webpages will the crawler find? **[1 mark]**

The crawler will find pages B, C, E and F.

- b. If any pages aren't found, explain why not. If all the pages are found, explain how each page is found. **[2 marks]**

The crawler won't find pages A and D because none of the pages that it will find (B, C, E and F) have links to A and D.

- c. In 2-3 sentences, explain what a search engine's index is, and how it's used. **[2 marks]**

A search engine's index is its map between keywords and webpages. The crawler builds up the index by adding keyword/webpage pairs and the query processor uses the index to find webpages that match the keywords entered by the user.



5. Answer the following questions about Privacy and Security

- a. Why isn't it safe to send your credit card information in an unencrypted email? **[2 marks]**

It isn't safe to send your credit card information in an unencrypted email because the email could be intercepted at any point during its journey through different nodes in the internet. If it was intercepted by a malicious person, they could steal the credit card information.

- b. Encrypt the word midterm using a Caesar Cipher with a key of 8. **[1 mark]**

uqlbmzu

- c. Give an example of a good password (not one you actually use!) Why is it a good password? **[2 marks]**

C51o!iSf#n

This is a good password because

- It's based on a phrase so it's easy to remember (CS 101 is fun)
- It contains letters, digits and punctuation
- It's reasonably long (10 characters)

**The space below is intentionally blank.**

6. Your task is to write an algorithm to sort a stack of numbered cards. Each card has a number between 1-10 written on it. You don't know how many cards are in the stack. There may be multiple cards with the same number in the stack.
- a. What input will your algorithm need? **[1 mark]**

The stack of cards

- b. What output will your algorithm produce? **[1 mark]**

A stack of ordered cards.

- c. Write your algorithm. Make sure that all of your steps are clear and concise. **[6 marks]**

Pick up the first card and put it in the output stack

Repeat the following steps until the input pile is empty

Pick up the top card on the input stack

Repeat the following steps until the card is placed in the output pile

Look to see if there is another card in the output pile.

If there is another card in the output pile:

Look at the next card in the output pile.

If the card in your hand is less than the card in the output pile, put the card on top of the card in the output pile.

If there's not another card in the output pile, place your card at the back of the output pile.



7. Answer the following questions from the Minds and Machines unit.

a. What are two societal risks of pursuing artificial intelligence research? [**1 mark**]

- Loss of jobs for humans
- Machines could eventually be performing sensitive tasks that might be better done by humans

b. Which do you think is the most important risk, and why? [**2 marks**]

Depends on your answer for a.

c. Do you think that a computer program that could correctly translate from English to French, including idioms (expressions that mean something other than the literal meaning of its individual words), is intelligent? Refer to Searle's argument in your answer (whether you agree with him or not) [**2 marks**]

Both yes and no arguments were accepted here, as long as your made reference to Searle's argument.

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8. Answer the following questions about JavaScript.

- a. How many alert boxes will be displayed when the following code is executed? Show your work. **[2 marks]**

```
var arr = new Array(0, 2, -1, 4, 3);
var index = 0;
while (index < arr.length)
{
    if (arr[index] <= index)
    {
        alert("Hi");
    }
    index = index + 1;
}
```

3 – This code will pop up an alert when the value in the array (`arr[index]`) is less than or equal to the index. So, it will pop up an alert for indices 0, 2 and 4 (because  $0 \leq 0$ ,  $-1 \leq 2$  and  $3 \leq 4$ ) but not for indices 1 and 3 (because  $2 > 1$  and  $4 > 3$ )

- b. What is the value of y after the following code has executed? Show your work. **[2 marks]**

```
var x = 4;
var y = x + 2;
var count = 1;
while (count < x)
{
    y = y * 2;
    count = count + 1;
}
```

48. The body of the loop will execute 3 times (when count is 1, 2 and 3) so y will get doubled three times from 6 to 12 to 24 to 48.

- c. Write JavaScript code to calculate the product when all of the numbers in an array are multiplied together. Assume the array is stored in a variable named `arr`. You don't know how many numbers `arr` contains, but you can assume that every value stored in `arr` is a number. **[4 marks]**

```
var result = 1;
var index = 0;
while (index < arr.length)
{
    result = result * arr[index];
    index = index + 1;
}
```

- d. What change would you need to make to the code you wrote in part c if you only wanted to calculate the product of the positive values in the array? You can use JavaScript for your answer, or you can just explain the change that you would make. **[1 mark]**

```
var result = 1;
var index = 0;
while (index < arr.length)
{
    if (arr[index] > 0)
    {
        result = result * arr[index];
    }
    index = index + 1;
}
```

I would add the above bolded if statement.