The University of Western Ontario

Computer Science 2035b

Midterm Examination - Friday, February 28th, 2014

Surname	
Given Name	
Student Number	

This exam consists of 4 questions (8 pages including this page) worth a total of 100%. It is an open book exam, course notes and any MatLab book(s) are allowed. All answers are to be written in this booklet. Scrap work may be done on the back of each page; this will not be marked. No laptops or cell phones are allowed. The exam is 50 minutes long and comprises 20% of your final mark. Please print you full name and student number in the space provided below before you start this exam.

(1) 40%	
(2) 10%	
(3) 30%	
(4) 20%	
Total	

Professor: John Barron

(40%) Consider the following MatLab matrices A, B and C:

```
A= [19  4  5  6  8;
    30 22  7 12 13;
    28  2  3  5  9;
     8  9 10  5  4;
    19  4  6 24 9];
 B=[2 6; 4 9];
 C=[1; 2];
```

1. (4%) Using the original A above, if `A(2:4,2:4)=eye(3)` what is the value of A?

2. (4%) Using the original A above, if `A(2:4,2:4)=A(2:4,2:4)'` what is the value of A?

3. (4%) Using the original A array, what is the value of `reshape(A(2:3,2:4),3,2)`?

For partial marks, say what `A(2:3,2:4)` is.

4. (4%) What is `B*B`:

5. (4%) What is `B.*B`:

6. (4%) What if the value of `[B C]`?

7. (4%) What if the value of `[B; C']`?

8. (4%) Consider a 2 element column vector `s`. How would you solve the system of equations `B*s=C`?

9. (4%) What happens when we execute `A*B`?

10. (4%) What happens when we execute `A.*B`?

(2) (10%) This is the Lab question.

1. (3%) Consider the following expression: `1/2+3^2+4/5*6/7`. Parenthesize this expression according to the precedence of the operators.

   Parenthesized expression:

2. (7%) Draw the graph plotted by:

   ```
   x=[-1:0.1:1];
   plot(x,abs(x));
   title('asolute value');
   print abs.jpg -djpeg
   ```

   Label its x and y axes and show where the title is printed.

(3) (30%) This question is loosely related to Assignment 2.

1. Consider the evaluation a polynomial $p(x) = x^4 + x^3 + x^2 + x$ for x being a n component column vector `x=linspace(0,1,n)`.

    (a) (10%) Give the straightforward vectorization of this polynomial:

    (b) (10%) Give the vectorization of this polynomial that does the least number of multiplications.

2. (10%) Consider the following serialized loop that computes the above poly-nomial:

```
for i=1:1024
  x(i)=(i-1)/1023; % numbers between 0 and 1
  p(i)=x(i)^4+x(i)^3+x(i)^2+x(i);
end
```

Rewrite the loop so that MatLab's JIT complier can compile the loop:

(4) (20%) Consider the following matrix `Q=[1 2 3; 4 5 6; 7 8 9];`

(a) (5%) What does `L=Q>5` print?

(b) (5%) What does `C=find(Q>5)` print? (Hint: `find` returns the coordinates of `Q>5` as if `Q` were reshaped to be a column vector).

(c) (5%) What does `[m,n]=size(Q)` print?

(d) (5%) What does `sum(L(:))` compute?