

Sample exam questions

Applied Mathematics 261b

February 17, 2000

Check these items

Practise sending a diary file, or other Matlab file, by email. Send one to yourself as a test. Try sending figures also.

Type your answers to these questions either into a text file or into a Matlab '.m' file. In the real exam you will be expected to email your answers to the instructor.

Questions

1. How many digits of precision in the following numbers?
 - (a) 123.456
 - (b) 0.000123
 - (c) 1.234×10^6
 - (d) 1.2340×10^6
 - (e) 93 000 000
2. How many digits of precision does Matlab work to?
3. What is the effect of the `format short` command?
4. Explain why the variable y in the following script is not 0.

```
format short
x=1/3
y=x-0.3333
```

5. Write a Matlab function to evaluate the function $y = \sin^2(x^2)$. Plot the function.
6. Write a function 'check1' that takes a vector as input and prints an error message for all vectors that do not have exactly three components.
7. Write a function 'check2' that takes a vector as input and prints an error message unless every component is nonzero.
8. Write a function 'swap1' that takes a vector as input and returns another vector with the first two components swapped.
9. Write a function 'ordering' that takes a vector as input and returns another vector in which the components of the first vector are in descending order. Do not use the Matlab function `sort`.

10. Write a function 'outer1' that does the following. It takes as arguments two matrices that are $1 \times n$. Let the matrices be x and y . The output of the function `outer1` contains *two* (2) items. One is the product $x^T y$ and the other is the product $y x^T$. In these expressions, x^T is the transpose of the matrix x .

11. A student has the following function:

```
function result=myfun1(a)
reciprocal=1/a
result=2*reciprocal
```

In Matlab, the student types the following

```
a=3
myfun1(a)
reciprocal
```

What value does Matlab print for reciprocal, and why?

12. Plot the two functions $\cos x$ and $1 - \frac{1}{2}x^2$ on the same axes.

13. Find the polynomial that passes through the points

$$x = [1, 2, 3, 4, 5, 6] \quad y = [3, 1, 4, 1, 5, 9]$$

What is the value at $x = 3.5$?

14. Fit a polynomial through data obtained from $y = \cos x$. Choose 7 equally spaced points between $x = 0$ and $x = 3$. Find the value of x for which the polynomial is 0. How close is this value to the correct value?