



## Final Examination Question Pattern

- This document is meant to give you an idea of what you can expect in the final exam
- Text in red is for your information in this document. It will not be included in the final exam

### Multiple Choice Questions

Please indicate only one correct answer from the given choices. Each correct answer earns 2 points, and wrong answer loses –1 point. There is no negative marking for not attempting the question.

1. Which of the following is true for central difference formula for  $f'(x)$ 
  - a. It yields exact solution without any error
  - b. Error in the solution depends on function  $f$  only and not on step size
  - c. Is usually more accurate than forward difference formula for the same step size
  - d. Is usually less accurate than forward difference formula for the same step size

This is an MCQ. So, indicate only one correct answer, which is c. Note that wrong answer will earn negative points. Choose the answer that best fits what you saw while writing your codes.

### Match the Following

Please match the applications on the left column with MATLAB command on the right. Each item on the left may match with none, one or two commands on the right. Please choose all the correct answers and none of the wrong answers to get full credit.

2. Solving linear equations	<ol style="list-style-type: none"><li>a. \</li><li>b. cond</li><li>c. diff</li><li>d. inv</li><li>e. None of the above</li></ol>
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Correct answers will be:  a. and  d.

In this type of problem, each item in the left column may match with either 0, 1 or 2 items on the right. You need to choose all the correct and none of the wrong answers to get full points.

Also note that all commands on right hand side may not match with the left column.



### Objective Numerical Questions

In all of the questions below, please report a numeric answer.

- The command `cumsum(1:10)` results in a vector of length \_\_\_\_\_.
- The fifth element of the above vector is \_\_\_\_\_.

The answers to above question are  and , respectively.

### MATLAB Codes

In the problems below, please restrict your response to a single command you will execute on command prompt. The use of `for/while` loops and `if` statements is not permitted.

- Write a MATLAB code for computing factorial of a number  $n$ . Assume  $n$  is already defined. The code should return a scalar, not a vector.

The answer to the above question is: `prod(1:n)`

### Spot the Error

- In the screen-shot of the code shown below:

```
1      x=1:10;  
2      y=x^2;
```

indicate the line number where MATLAB is most likely to give an error. If there is no error, please enter 0.

Since  $x$  is a vector, we need to do element-wise power. This can be written as  $y=x.^2$ . Clearly, the error is in line 2.

### Writing a code

- Write a MATLAB code to obtain roots of the equation  $f(x) \equiv x^2 - 1 = 0$  using Newton-Raphson method. Take initial guess of  $x = 2$ . The expression for new guess using Newton-Raphson is given by:

$$x^{(i+1)} = x^{(i)} - \frac{f(x^{(i)})}{f'(x^{(i)})}$$