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Class: CSCI 20 - MATLAB Programming

Assignment: Homework 1

Date: 8-15-2024

Q. 1

```
a = 10
```

```
a = 10
```

```
b = 2.5 * 10^12
```

```
b = 2.5000e+12
```

```
c = 3 + 5i
```

```
c = 3.0000 + 5.0000i
```

```
d = exp(1j*2*pi/3)
```

```
d = -0.5000 + 0.8660i
```

Q. 2

```
ans_q2a = 2-(4*5^(3-2))/(2*(5+6))
```

```
ans_q2a = 1.0909
```

```
l = 5
```

```
l = 5
```

```
t = 3
```

```
t = 3
```

```
h = 10
```

```
h = 10
```

```


V = (1/3)*(l^2+l*t+t^2)*h
```

```
V = 163.3333
```

Q. 3

```
aVec = [3.14 15 9 26]
```

```
aVec = 1×4
    3.1400   15.0000    9.0000   26.0000
```

```
bVec = [10; 4; 19.4; exp(2)]
```

```
bVec = 4×1
   10.0000
    4.0000
   19.4000
    7.3891
```

```
cVec = 5 : -.2 : -5
```

```
cVec = 1×51
    5.0000    4.8000    4.6000    4.4000    4.2000    4.0000    3.8000    3.6000 ···
```

```
dVec = logspace(0,1,101) % 101 numbers between 0 and 100 inclusive.
```

```
dVec = 1×101
    1.0000    1.0233    1.0471    1.0715    1.0965    1.1220    1.1482    1.1749 ···
```

Q. 4

```
% aMat = [2 2 2 2 2 2 2 2; 2 2 2.. JK
aMat = 2 * ones(8)
```

```
aMat = 8×8
     2     2     2     2     2     2     2     2
     2     2     2     2     2     2     2     2
     2     2     2     2     2     2     2     2
     2     2     2     2     2     2     2     2
     2     2     2     2     2     2     2     2
     2     2     2     2     2     2     2     2
     2     2     2     2     2     2     2     2
     2     2     2     2     2     2     2     2
```

```
bMat = diag([1 2 3 4 5 4 3 2 1])
```

```
bMat = 9×9
     1     0     0     0     0     0     0     0     0
     0     2     0     0     0     0     0     0     0
     0     0     3     0     0     0     0     0     0
     0     0     0     4     0     0     0     0     0
     0     0     0     0     5     0     0     0     0
     0     0     0     0     0     4     0     0     0
     0     0     0     0     0     0     3     0     0
     0     0     0     0     0     0     0     2     0
     0     0     0     0     0     0     0     0     1
```

```
cMat = reshape(1 : 100, [10,10])
```

```
cMat = 10×10
     1    11    21    31    41    51    61    71    81    91
     2    12    22    32    42    52    62    72    82    92
     3    13    23    33    43    53    63    73    83    93
     4    14    24    34    44    54    64    74    84    94
     5    15    25    35    45    55    65    75    85    95
     6    16    26    36    46    56    66    76    86    96
     7    17    27    37    47    57    67    77    87    97
     8    18    28    38    48    58    68    78    88    98
     9    19    29    39    49    59    69    79    89    99
    10    20    30    40    50    60    70    80    90   100
```

Q. 5

```
disp("Stirling's formula (n!) vs. MATLAB factorial function (f(n))")
```

```
Stirling's formula (n!) vs. MATLAB factorial function (f(n))
```

```
for n = 1:20
    factorialApprox = sqrt(2*pi*n)*(n/exp(1))^n;
    factorialFunc = factorial(n);

    disp(n + "!: " + factorialApprox + ", f(" + n + "): " + factorialApprox)
end
```

```
1!: 0.92214, f(1): 0.92214
2!: 1.919, f(2): 1.919
3!: 5.8362, f(3): 5.8362
4!: 23.5062, f(4): 23.5062
5!: 118.0192, f(5): 118.0192
6!: 710.0782, f(6): 710.0782
7!: 4980.3958, f(7): 4980.3958
8!: 39902.3955, f(8): 39902.3955
9!: 359536.8728, f(9): 359536.8728
10!: 3598695.6187, f(10): 3598695.6187
11!: 39615625.0506, f(11): 39615625.0506
12!: 475687486.4728, f(12): 475687486.4728
13!: 6187239475.1927, f(13): 6187239475.1927
14!: 86661001740.5988, f(14): 86661001740.5988
15!: 1300430722199.468, f(15): 1300430722199.468
16!: 20814114415223.14, f(16): 20814114415223.14
17!: 353948328666101.1, f(17): 353948328666101.1
18!: 6372804626194313, f(18): 6372804626194313
19!: 1.211127865922942e+17, f(19): 1.211127865922942e+17
20!: 2.422786846761135e+18, f(20): 2.422786846761135e+18
```

Q. 6

The largest value of n that MATLAB will allow in this difference calculation is n = 170.

```
for n = 10 : 200
    n
    log(sqrt(2*pi*n)*(n/exp(1))^n) - (n * log(n) - n)
end
```

```
n = 10
ans = 2.0702
n = 11
ans = 2.1179
n = 12
ans = 2.1614
n = 13
ans = 2.2014
n = 14
ans = 2.2385
n = 15
ans = 2.2730
n = 16
ans = 2.3052
n = 17
ans = 2.3355
n = 18
ans = 2.3641
n = 19
ans = 2.3912
n = 20
```

```
ans = 2.4168
n = 21
ans = 2.4412
n = 22
ans = 2.4645
n = 23
ans = 2.4867
n = 24
ans = 2.5080
n = 25
ans = 2.5284
n = 26
ans = 2.5480
n = 27
ans = 2.5669
n = 28
ans = 2.5850
n = 29
ans = 2.6026
n = 30
ans = 2.6195
n = 31
ans = 2.6359
n = 32
ans = 2.6518
n = 33
ans = 2.6672
n = 34
ans = 2.6821
n = 35
ans = 2.6966
n = 36
ans = 2.7107
n = 37
ans = 2.7244
n = 38
ans = 2.7377
n = 39
ans = 2.7507
n = 40
ans = 2.7634
n = 41
ans = 2.7757
n = 42
ans = 2.7878
n = 43
ans = 2.7995
n = 44
ans = 2.8110
n = 45
ans = 2.8223
n = 46
ans = 2.8333
n = 47
ans = 2.8440
n = 48
ans = 2.8545
n = 49
ans = 2.8648
n = 50
ans = 2.8750
n = 51
ans = 2.8849
n = 52
```

```
ans = 2.8946
n = 53
ans = 2.9041
n = 54
ans = 2.9134
n = 55
ans = 2.9226
n = 56
ans = 2.9316
n = 57
ans = 2.9405
n = 58
ans = 2.9492
n = 59
ans = 2.9577
n = 60
ans = 2.9661
n = 61
ans = 2.9744
n = 62
ans = 2.9825
n = 63
ans = 2.9905
n = 64
ans = 2.9984
n = 65
ans = 3.0061
n = 66
ans = 3.0138
n = 67
ans = 3.0213
n = 68
ans = 3.0287
n = 69
ans = 3.0360
n = 70
ans = 3.0432
n = 71
ans = 3.0503
n = 72
ans = 3.0573
n = 73
ans = 3.0642
n = 74
ans = 3.0710
n = 75
ans = 3.0777
n = 76
ans = 3.0843
n = 77
ans = 3.0908
n = 78
ans = 3.0973
n = 79
ans = 3.1037
n = 80
ans = 3.1100
n = 81
ans = 3.1162
n = 82
ans = 3.1223
n = 83
ans = 3.1284
n = 84
```

```
ans = 3.1343
n = 85
ans = 3.1403
n = 86
ans = 3.1461
n = 87
ans = 3.1519
n = 88
ans = 3.1576
n = 89
ans = 3.1633
n = 90
ans = 3.1688
n = 91
ans = 3.1744
n = 92
ans = 3.1798
n = 93
ans = 3.1852
n = 94
ans = 3.1906
n = 95
ans = 3.1959
n = 96
ans = 3.2011
n = 97
ans = 3.2063
n = 98
ans = 3.2114
n = 99
ans = 3.2165
n = 100
ans = 3.2215
n = 101
ans = 3.2265
n = 102
ans = 3.2314
n = 103
ans = 3.2363
n = 104
ans = 3.2411
n = 105
ans = 3.2459
n = 106
ans = 3.2507
n = 107
ans = 3.2554
n = 108
ans = 3.2600
n = 109
ans = 3.2646
n = 110
ans = 3.2692
n = 111
ans = 3.2737
n = 112
ans = 3.2782
n = 113
ans = 3.2826
n = 114
ans = 3.2870
n = 115
ans = 3.2914
n = 116
```

```
ans = 3.2957
n = 117
ans = 3.3000
n = 118
ans = 3.3043
n = 119
ans = 3.3085
n = 120
ans = 3.3127
n = 121
ans = 3.3168
n = 122
ans = 3.3209
n = 123
ans = 3.3250
n = 124
ans = 3.3291
n = 125
ans = 3.3331
n = 126
ans = 3.3371
n = 127
ans = 3.3410
n = 128
ans = 3.3450
n = 129
ans = 3.3488
n = 130
ans = 3.3527
n = 131
ans = 3.3565
n = 132
ans = 3.3603
n = 133
ans = 3.3641
n = 134
ans = 3.3679
n = 135
ans = 3.3716
n = 136
ans = 3.3753
n = 137
ans = 3.3789
n = 138
ans = 3.3826
n = 139
ans = 3.3862
n = 140
ans = 3.3898
n = 141
ans = 3.3933
n = 142
ans = 3.3969
n = 143
ans = 3.4004
n = 144
ans = 3.4038
n = 145
ans = 3.4073
n = 146
ans = 3.4107
n = 147
ans = 3.4142
n = 148
```

```
ans = 3.4175
n = 149
ans = 3.4209
n = 150
ans = 3.4243
n = 151
ans = 3.4276
n = 152
ans = 3.4309
n = 153
ans = 3.4342
n = 154
ans = 3.4374
n = 155
ans = 3.4407
n = 156
ans = 3.4439
n = 157
ans = 3.4471
n = 158
ans = 3.4502
n = 159
ans = 3.4534
n = 160
ans = 3.4565
n = 161
ans = 3.4596
n = 162
ans = 3.4627
n = 163
ans = 3.4658
n = 164
ans = 3.4689
n = 165
ans = 3.4719
n = 166
ans = 3.4749
n = 167
ans = 3.4779
n = 168
ans = 3.4809
n = 169
ans = 3.4839
n = 170
ans = 3.4868
n = 171
ans = Inf
n = 172
ans = Inf
n = 173
ans = Inf
n = 174
ans = Inf
n = 175
ans = Inf
n = 176
ans = Inf
n = 177
ans = Inf
n = 178
ans = Inf
n = 179
ans = Inf
n = 180
```

```
ans = Inf
n = 181
ans = Inf
n = 182
ans = Inf
n = 183
ans = Inf
n = 184
ans = Inf
n = 185
ans = Inf
n = 186
ans = Inf
n = 187
ans = Inf
n = 188
ans = Inf
n = 189
ans = Inf
n = 190
ans = Inf
n = 191
ans = Inf
n = 192
ans = Inf
n = 193
ans = Inf
n = 194
ans = Inf
n = 195
ans = Inf
n = 196
ans = Inf
n = 197
ans = Inf
n = 198
ans = Inf
n = 199
ans = Inf
n = 200
ans = Inf
```