ITA0448 - R PROGRAMMING
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1. Will the following code return any error? State the reason behind your answer and explain the logic behind the code

val <- numeric()
result <- vector("list", length(val))
for (index in 1:length(val)) {
result[index] <- val[index] ^ 2
}

Answer:
i) there are attempting to reference an object you have not created.

ii) there are running a chunk of code where the object has not been defined in that chunk.

2. . What is the value of equation1(3) for the following R code and explain the logic.
> num <- 4
> equation1 <- function (val)
+ {
+ num <- 3
+ num^3 + g (val)
+ }
> equation2 <- function (val)
+ {
+ val*num
+ }
}

3. Write R function to find nth highest value of a vector in the R program

Answer:
Input:

```
x = c(10, 20, 30, 20, 20, 25, 9, 26)
print(" Vectors:")
print(x)
print("nth highest value in a given vector:")
print("n = 1")
n = 1
print(sort(x, TRUE)[n])
print("n = 2")
n = 2
print(sort(x, TRUE)[n])
print("n = 3")
n = 3
print(sort(x, TRUE)[n])
```

```
print("n = 4")
n = 4
print(sort(x, TRUE)[n])
```

Output:

```
[1] " Vectors:"
[1]10 20 30 20 20 25    9 26
[1] "nth highest value in a given vector:"
[1] "n = 1"
[1] 30
[1] "n = 2"
[1] 26
[1] "n = 3"
[1] 25
[1] "n = 4"
[1] 20
```

4. Explore the airquality dataset. It contains daily air quality measurements from New York during a period of five months:

• Ozone: mean ozone concentration (ppb), • Solar.R: solar radiation (Langley),
• Wind: average wind speed (mph), • Temp: maximum daily temperature in degrees Fahrenheit,
• Month: numeric month (May=5, June=6, and so on),• Day: numeric day of the month (1 -4).

i. Compute the mean temperature(don't use build in function)

Program:

```
data(airquality)
mean_temp<-sum(airquality$Temp)/nrow(airquality)
mean_temp
```

Output:

```
> mean_temp
[1] 77.88235
```

ii.Extract the first five rows from airquality.

Program:

```
data(airquality)
head(airquality,5)
```

Output:

```
> head(airquality,5)
   Ozone Solar.R Wind Temp Month Day
1     41     190  7.4   67     5   1
2     36     118  8.0   72     5   2
3     12     149 12.6   74     5   3
4     18     313 11.5   62     5   4
5     NA      NA 14.3   56     5   5
```

iii.Extract all columns from airquality except Temp and Wind

Program:

```
data(airquality)
airquality[,c("Ozone", "Solar.R", "Month", "Day")]
```

Output:

```
> airquality[,c("Ozone", "Solar.R", "Month", "Day")]
```

	Ozone	Solar.R	Month	Day
1	41	190	5	1
2	36	118	5	2
3	12	149	5	3
4	18	313	5	4
5	NA	NA	5	5
6	28	NA	5	6
7	23	299	5	7
8	19	99	5	8
9	8	19	5	9
10	NA	194	5	10
11	7	NA	5	11
12	16	256	5	12
13	11	290	5	13
14	14	274	5	14
15	18	65	5	15
16	14	334	5	16
17	34	307	5	17
18	6	78	5	18
19	30	322	5	19
20	11	44	5	20
21	1	8	5	21
22	11	320	5	22
23	4	25	5	23
24	32	92	5	24
25	NA	66	5	25
26	NA	266	5	26
27	NA	NA	5	27
28	23	13	5	28
29	45	252	5	29
30	115	223	5	30
31	37	279	5	31
32	NA	286	6	1
33	NA	287	6	2
34	NA	242	6	3
35	NA	186	6	4
36	NA	220	6	5
37	NA	264	6	6
38	29	127	6	7
39	NA	273	6	8

40	71	291	6	9
41	39	323	6	10
42	NA	259	6	11
43	NA	250	6	12
44	23	148	6	13
45	NA	332	6	14
46	NA	322	6	15
47	21	191	6	16
48	37	284	6	17
49	20	37	6	18
50	12	120	6	19
51	13	137	6	20
52	NA	150	6	21
53	NA	59	6	22
54	NA	91	6	23
55	NA	250	6	24
56	NA	135	6	25
57	NA	127	6	26
58	NA	47	6	27
59	NA	98	6	28
60	NA	31	6	29
61	NA	138	6	30
62	135	269	7	1
63	49	248	7	2
64	32	236	7	3
65	NA	101	7	4
66	64	175	7	5
67	40	314	7	6
68	77	276	7	7
69	97	267	7	8
70	97	272	7	9
71	85	175	7	10
72	NA	139	7	11
73	10	264	7	12
74	27	175	7	13
75	NA	291	7	14
76	7	48	7	15
77	48	260	7	16
78	35	274	7	17
79	61	285	7	18
80	79	187	7	19
81	63	220	7	20
82	16	7	7	21
83	NA	258	7	22
84	NA	295	7	23

85	80	294	7	24
86	108	223	7	25
87	20	81	7	26
88	52	82	7	27
89	82	213	7	28
90	50	275	7	29
91	64	253	7	30
92	59	254	7	31
93	39	83	8	1
94	9	24	8	2
95	16	77	8	3
96	78	NA	8	4
97	35	NA	8	5
98	66	NA	8	6
99	122	255	8	7
100	89	229	8	8
101	110	207	8	9
102	NA	222	8	10
103	NA	137	8	11
104	44	192	8	12
105	28	273	8	13
106	65	157	8	14
107	NA	64	8	15
108	22	71	8	16
109	59	51	8	17
110	23	115	8	18
111	31	244	8	19
112	44	190	8	20
113	21	259	8	21
114	9	36	8	22
115	NA	255	8	23
116	45	212	8	24
117	168	238	8	25
118	73	215	8	26
119	NA	153	8	27
120	76	203	8	28
121	118	225	8	29
122	84	237	8	30
123	85	188	8	31
124	96	167	9	1
125	78	197	9	2
126	73	183	9	3
127	91	189	9	4
128	47	95	9	5
129	32	92	9	6

130	20	252	9	7
131	23	220	9	8
132	21	230	9	9
133	24	259	9	10
134	44	236	9	11
135	21	259	9	12
136	28	238	9	13
137	9	24	9	14
138	13	112	9	15
139	46	237	9	16
140	18	224	9	17
141	13	27	9	18
142	24	238	9	19
143	16	201	9	20
144	13	238	9	21
145	23	14	9	22
146	36	139	9	23
147	7	49	9	24
148	14	20	9	25
149	30	193	9	26
150	NA	145	9	27
151	14	191	9	28
152	18	131	9	29
153	20	223	9	30

iv.Which was the coldest day during the period?
Program:

```
data(airquality)
coldest_day<-airquality[which.min(airquality$Temp),]
coldest_day
```

Output:

```
      NA         NA 14.3     56        5     5
```

v.How many days was the wind speed greater than 17 mph?
Program:

```
data(airquality)
sum(airquality$Wind>17)
```

Output:

```
> sum(airquality$Wind>17)
[1] 3
```

5. Write R Program to find maximum and minimum value of a given vector using control
statement.

Input:

```
x = c(10, 20, 30, 25, 9, 26)
print("Original Vectors:")
print(x)
print("Maximum value of the above Vector:")
print(max(x))
print("Minimum value of the above Vector:")
print(min(x))
```

Output:

```
[1] "Original Vectors:"
[1] 10 20 30 25  9 26
[1] "Maximum value of the above Vector:"
[1] 30
[1] "Minimum value of the above Vector:"
[1] 9
```

6)Write a R program to create three vectors a,b,c with 3 integers. Combine the three
vectors to become a 3◊3 matrix where each column represents a vector. Print the content of
the matrix.

INPUT:

```
a<-c(1,2,3)
b<-c(4,5,6)
c<-c(7,8,9)
m<-cbind(a,b,c)
print("the given 3*3 matrix:")
print(m)
```

OUTPUT:

```
[1] "the given 3*3 matrix:"
     a b c
[1,] 1 4 7
[2,] 2 5 8
[3,] 3 6 9
```