```
def Euler2(k , Ta , t0 , T0 , tn , h):
  # print headings and initial conditions
  print(f"values of t approximations v(t)\n")
  print(f"{'%8.3f'%t0} {'%19.4f'%T0}")

  # set t, v, to the initial values
  t = t0
  T = T0

  # compute v(t) over n time steps using Euler's method
  while (t < tn):
    T = -k * (T - Ta) * h + T
    t=t+h;
    print(f"{'%8.3f'%t} {'%19.4f'%T}")
  return T
```

2b)

```
final_temp = Euler2 ( 0.019 , 20 , 0 , 68 , 12 , 0.125)
values of t approximations v(t)

   0.000             68.0000
   0.125             67.8860
   0.250             67.7723
   0.375             67.6588
   0.500             67.5456
   0.625             67.4327
   0.750             67.3200
   0.875             67.2077
   1.000             67.0955
   1.125             66.9837
   1.250             66.8721
   1.375             66.7608
   1.500             66.6497
   1.625             66.5389
   1.750             66.4284
   1.875             66.3181
   2.000             66.2081
   2.125             66.0984
   2.250             65.9889
   2.375             65.8797
   2.500             65.7707
   2.625             65.6620
   2.750             65.5536
   2.875             65.4454
   3.000             65.3374
   3.125             65.2298
   3.250             65.1223
   3.375             65.0152
   3.500             64.9083
   3.625             64.8016
   3.750             64.6952
   3.875             64.5891
   4.000             64.4832
   4.125             64.3775
   4.250             64.2721
   4.375             64.1670
   4.500             64.0621
   4.625             63.9574
   4.750             63.8530
   4.875             63.7489
   5.000             63.6450
   5.125             63.5413
   5.250             63.4379
```

5.375	63.3347
5.500	63.2318
5.625	63.1291
5.750	63.0267
5.875	62.9245
6.000	62.8226
6.125	62.7209
6.250	62.6194
6.375	62.5182
6.500	62.4172
6.625	62.3165
6.750	62.2160
6.875	62.1157
7.000	62.0157
7.125	61.9159
7.250	61.8163
7.375	61.7170
7.500	61.6179
7.625	61.5191
7.750	61.4205
7.875	61.3221
8.000	61.2240
8.125	61.1261
8.250	61.0284
8.375	60.9310
8.500	60.8337
8.625	60.7368
8.750	60.6400
8.875	60.5435
9.000	60.4472
9.125	60.3511
9.250	60.2553
9.375	60.1597
9.500	60.0643
9.625	59.9692
9.750	59.8742
9.875	59.7795
10.000	59.6851
10.125	59.5908
10.250	59.4968
10.375	59.4030
10.500	59.3094
10.625	59.2160
10.750	59.1229
10.875	59.0300
11.000	58.9373
11.125	58.8448

11.250	58.7526
11.375	58.6605
11.500	58.5687
11.625	58.4771
11.750	58.3857
11.875	58.2946
12.000	58.2036

2c)

```
temp = 20 + 48 * math.exp(-0.019 * (12))
print(temp)
print(abs(1 - (final_temp/temp)))
```

```
58.21396447210178
0.0001779888569950483
```