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Q1.(a)

```
function Euler(m,c,t0,v0,tn,n,g)
% print headings and initial conditions
fprintf('values of t approximations v(t)\n')
fprintf('%8.3f',t0),fprintf('%19.4f\n',v0)
% initialize gravitational constant, compute step size h
h=(tn-t0)/n;
% set t,v to the initial values
t=t0;
v=v0;
% compute v(t) over n time steps using Euler's method
for i=1:n
v=v+(g-c/m*v)*h;
t=t+h;
fprintf('%8.3f',t),fprintf('%19.4f\n',v)
end
```

Q1.(b)

```
>> Euler(70.5,12.5,0,0,12,15,9.81)
values of t approximations v(t)
   0.000             0.0000
   0.800             7.8480
   1.600            14.5828
   2.400            20.3623
   3.200            25.3221
   4.000            29.5783
   4.800            33.2308
   5.600            36.3652
   6.400            39.0550
   7.200            41.3633
   8.000            43.3442
   8.800            45.0440
   9.600            46.5028
  10.400            47.7547
  11.200            48.8290
  12.000            49.7509
```

Q1.(c)

```
>> Euler(70.5,12.5,0,0,12,15,3.71)
values of t approximations v(t)
   0.000             0.0000
```

```
   0.800              2.9680
   1.600              5.5150
   2.400              7.7007
   3.200              9.5764
   4.000             11.1861
   4.800             12.5674
   5.600             13.7528
   6.400             14.7700
   7.200             15.6430
   8.000             16.3921
   8.800             17.0350
   9.600             17.5867
  10.400             18.0601
  11.200             18.4664
  12.000             18.8151
```

Q1.(d)

```
>> 9.81*70.5*(1-exp(-12.5*12/70.5))/12.5

ans =

   48.7379
```

V(12)= 48.7379

```
>> abs((48.7379-49.7509)/48.7379)

ans =

   0.0208
```

$|\varepsilon t| = 0.0208$

Q1.(e)

If we take the limit as $t \to \infty$, $V(\infty)=gm/c$.

```
>> 9.81*74/12.5

ans =

   58.0752
```

That is $V(\infty)=58.0752$

Q2.(a)

(128.6)base(10)ROUGHLY EQUALS TO(200.406)base(8)

Because k=2 and b=8,the answer is 0.2*8^3

Q2.(b)

$0.d_1d_2\times8^{C_1}$, $d_1 \in[1,7]$, $d_2 \in [0,7], c_1 \in [0,7]$

That is 7*8*8=488 numbers.

Q2.(c)

[64,512)=>$[8^2, 8^3)$ that is b=8,k=2, then t=3

So the gap is $8^{t-k} = 8^{3-2}$=8

Q2.(d)

The largest number is 63*8^75

Q3.(a)

$$\frac{-b \pm \sqrt{b^2-4ac}}{2a}$$

fl(2a)=0.2000×10^1

fl(-b)=98.76

fl(b^2)= fl(9753.5376)=9753

fl(4ac)=0.4×10^1

fl(b^2-4ac)= fl(9753-4)=9749

fl($\sqrt{b^2-4ac}$)=fl($\sqrt{b^2-4ac}$)=98.73

fl(-b+$\sqrt{b^2-4ac}$)= 197.4

fl($\frac{-b+\sqrt{b^2-4ac}}{2a}$)= fl($\frac{197.4}{2}$)=98.70

Q3.(b)

$$\frac{-2c}{b \pm \sqrt{b^2-4ac}}$$

fl(-2c)= -0.2000×10^1

$fl(b) = -98.76$

$fl(b^2) = fl(9753.5376) = 9753$

$fl(4ac) = 0.4\times 10^1$

$fl(b^2 - 4ac) = fl(9753-4) = 9749$

$fl(\sqrt{b^2 - 4ac}) = fl(b^2 - 4ac) = 98.73$

$fl(b+\sqrt{b^2 - 4ac}) = -0.3\times 10^{-1}$

$fl(\frac{-2c}{b+\sqrt{b^2-4ac})}) = fl(\frac{-2}{-0.03}) = 66.66$

Q3.(c)

For parr A:

$$|\varepsilon_t| = |1 - p*/p|$$

$$|\varepsilon_t| = |1 - 98.70/98.7499| = 0.505\times 10^{-3}$$

For part B:

$$|\varepsilon_t| = |1 - p*/p|$$
$$|\varepsilon_t| = |1 - 66.66/98.7499| = 0.325$$

Therefore, part A has more accurate answer.