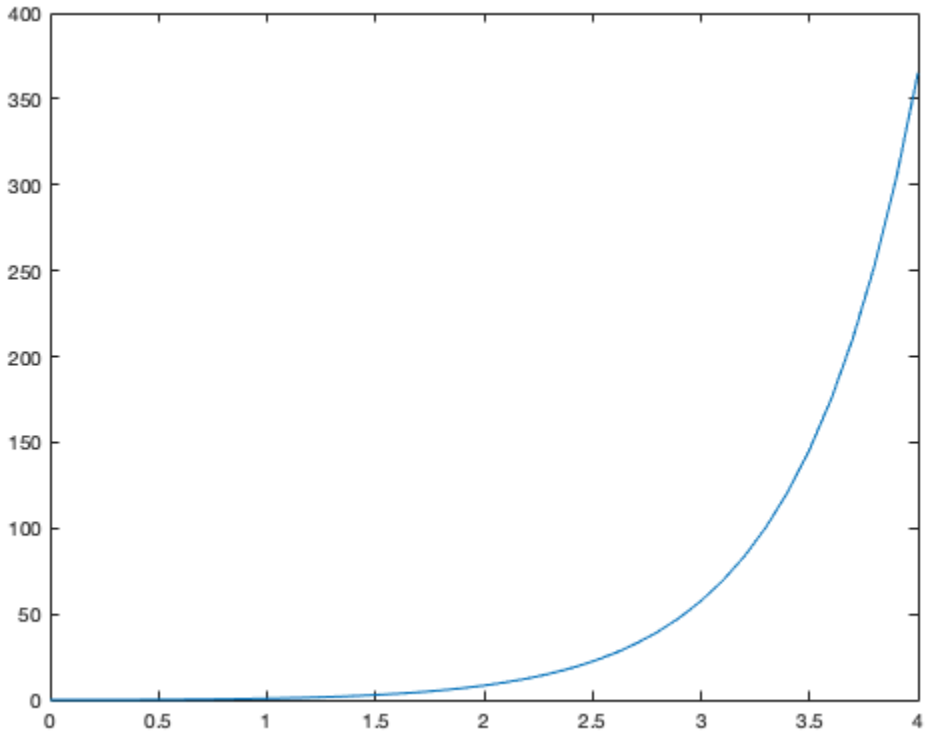
Euler's Method

Citation: https://www.mathworks.com/matlabcentral/answers/278300-matlab-code-help-on-euler-s-method Initial conditions and setup

```
h = 0.1;  % step size
x = 0:h:4;  % the range of x
y = zeros(size(x));  % allocate the result y
y(1) = 0;  % the initial y value
n = numel(y);  % the number of y values
% The loop to solve the DE
for i=1:n-1
    f = x(i)+2*y(i); %the expression for y' in your DE
    y(i+1) = y(i) + h*f;
end
x
y
plot(x,y)
```

```
x =

  Columns 1 through 7

         0    0.1000    0.2000    0.3000    0.4000    0.5000    0.6000

  Columns 8 through 14

    0.7000    0.8000    0.9000    1.0000    1.1000    1.2000    1.3000

  Columns 15 through 21

    1.4000    1.5000    1.6000    1.7000    1.8000    1.9000    2.0000

  Columns 22 through 28

    2.1000    2.2000    2.3000    2.4000    2.5000    2.6000    2.7000

  Columns 29 through 35

    2.8000    2.9000    3.0000    3.1000    3.2000    3.3000    3.4000

  Columns 36 through 41

    3.5000    3.6000    3.7000    3.8000    3.9000    4.0000


y =

  Columns 1 through 7

         0         0    0.0100    0.0320    0.0684    0.1221    0.1965
```

```
Columns 8 through 14

  0.2958    0.4250    0.5899    0.7979    1.0575    1.3790    1.7748

Columns 15 through 21

  2.2598    2.8518    3.5721    4.4465    5.5058    6.7870    8.3344

Columns 22 through 28

 10.2013   12.4515   15.1618   18.4242   22.3491   27.0689   32.7426

Columns 29 through 35

 39.5612   47.7534   57.5941   69.4129   83.6055  100.6466  121.1059

Columns 36 through 41

145.6671  175.1505  210.5406  253.0187  304.0024  365.1929
```



Solve 1st order linear ODE symbolically

Citation: https://www.mathworks.com/help/symbolic/solve-a-single-differential-equation.html

```
syms y(t)
```

```
ode = diff(y,t) == t+2*y; % diff(dependent, independent)
ySol(t) = dsolve(ode)

%With initial condition
cond = y(1) == 0;
ySol(t) = dsolve(ode,cond)
```

```
ySol(t) =

(C5*exp(2*t))/4 - t/2 - 1/4


ySol(t) =

(3*exp(2*t)*exp(-2))/4 - t/2 - 1/4
```

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