Day 21

Solving ODE's using python rather than excel

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In [21]:
```python
from math import sin
from numpy import arange
#from pylab import plot,xlabel,ylabel,show
from matplotlib.pyplot import subplots

def f(x,t):
    return -x**3 + sin(t)

a = 0.0             # Start of the interval
b = 10.0            # End of the interval
N = 100             # Number of steps
h = (b-a)/N         # Size of a single step
x = 0.0             # Initial condition

tpoints = arange(a,b,h)
xpoints = []
for t in tpoints:
    xpoints.append(x)
    x += h*f(x,t)

fig, ax = subplots()
ax.plot(tpoints,xpoints)
ax.set_xlabel("t")
```

```
ax.set_ylabel("x(t)")
```

Out[21]: Text(0, 0.5, 'x(t)')

In [3]:
```
len(xpoints)
```

Out[3]: 1000

In [8]:
```
tpoints[0:10]
```

Out[8]: array([0. , 0.01, 0.02, 0.03, 0.04, 0.05, 0.06, 0.07, 0.08, 0.09])

In [9]:
```
xpoints[0:10]
```

Out[9]: [0.0,
 0.0,
 9.999833334166665e-05,
 0.000299985000264998,
 0.000599940002019995,
 0.0009998333417269847,
 0.001499625024438767,
 0.0020992650555085174,
 0.002798693436371044,
 0.003597840156849931]

In [ ]:

```
ax.set_ylabel("x(t)")
```

Out[21]: Text(0, 0.5, 'x(t)')