Math 118 { Homework #3 (6 points)

a. Use Euler's Method with ¢t = 1 to obtain an approximation for y(1) ¼ 0:41.

t	y	y'	¢y	¢t
0	0.41	0	0	1
1	0.41	XXX	XXX	XXX

Use Euler's Method ¢ = :5 to obtain an approximation for y(1) ¼ 0:4510125.

t	y	y'	¢y	¢t
0	0.41	0	0	.5
.5	0.41	.08025	.040125	.5
1.0	0.450125	XXX	XXX	XXX

Use Euler's Method with ¢ = :25 to obtain an approximation for y(1) ¼ 0:48078125.

t	y	y'	¢y	¢t
0	0.41	0	0	.25
.25	0.41	.0200625	.005015625	.25
.50	0.415015625	.08025	.020625	.25
.75	0.435640625	.1805625	.045140625	.25
1.0	0.480781250	XXX	XXX	XXX

b. The exact solution can be found by solving the IVP// $y' = 0{:}321t^2$) $y = {:}107t^3 + C$ and when t = 0, y = 0:41 so C = 0:41 so the exact solution is $y(t) = 0{:}41 + 0{:}107t^3$. The exact value of $y(1) = 0{:}1071^3 + {:}41 = 0{:}517$

The approximate answers are all under-estimates which get more accurate as ¢t gets smaller. They are underestimates because the initial slope at t = 0 is zero and the exact solution we know is concave up at that point for t > 0.