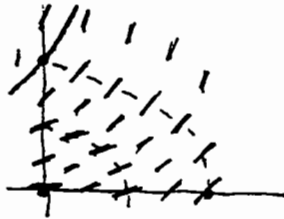


Part I Problems and Solutions

Problem 1: Use the Euler method and the step size .1 on the IVP $y' = x + y^2$, $y(0) = 1$, to calculate an approximate value for the solution $y(x)$ when $x = .1, .2, .3$. (Make a table.) Is your answer for $y(.3)$ too high or low?

Solution: Euler method formula: $y_{n+1} = y_n + hf(x_n, y_n)$.

x_n	y_n	$f(x_n, y_n)$	$hf(x_n, y_n)$	$h = .1$
0	1	1	.1	$f(x, y) =$
.1	1.1	1.31	.131	$x + y^2$
.2	1.23	1.72	.172	
.3	1.403			



Isoclines $x + y^2 = C$ (parabolas).

Solution curve through $(0, 1)$ is convex (concave up), so Euler method gives too *low* a result.

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18.03SC Differential Equations
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