

1. (10) Let

$$\begin{aligned} y' &= y^2 - 5t \\ y(0) &= 1 \end{aligned}$$

Determine whether this problem is stable or unstable at $t = 0$.

Answer: $f(t, y) = y^2 - 5t$, so $f_y = 2y$. At $t = 0$, $f_y = 2$, so the problem is unstable.

2. (10) Apply Euler's method with a stepsize of $h = .1$ to the problem

$$\begin{aligned} y' &= y^2 - 5t \\ y(0) &= 1 \end{aligned}$$

to compute approximations for $y(.1)$, $y(.2)$, and $y(.3)$.

t_n	y_n	$f(t_n, y_n)$
0	1	1
Answer: .1	1.1	.71
.2	1.171	.3712
.3	1.2081	