

MAT 125B - Homework # 7

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To test that the numerical computations are returning accurate numerical approximations, we test on a variety of known solutions. Moreover, by ensuring that the error does decrease according to the expected local truncation error by Taylor's theorem for each method, we can instill more confidence in the result. Consider the following initial value problems (IVP).

$\mathbf{y}' = \mathbf{f}(\mathbf{t}, \mathbf{y}(\mathbf{t}))$	$\mathbf{y}(\mathbf{t}_0) = \mathbf{y}_0$	$\mathbf{y}(\mathbf{t})$
$y' = 2y(t)/t$	$y(-1) = 3$	$y(t) = 3t^2$
$y' = 2t^2y(t)$	$y(0) = 2$	$y(t) = 2e^{2t^3/3}$
$y' = y(t)^t$	$y(-2) = 1.5874$	$y(t) = (10 - t(t - 1))^{1/(1-t)}$
$y' = ty(t)^2$	$y(-1) = 1$	$y(t) = 2/(3 - t^2)$

1. Selection of known Initial Value Problems