

Score:

Name: _____
Period (circle one): 1 2 3 4 5 6
Team (circle one): a b c d e f

SM286 – Quiz 14 – Appendix 2 Systems of DEs/Euler’s Method

1. Write the given system of differential equations without use of matrices:

$$X' = \begin{pmatrix} 2 & 1 \\ 1 & -1 \end{pmatrix} X + \begin{pmatrix} -5 \\ 2 \end{pmatrix}$$

$$x' = 2x + y - 5$$
$$y' = x - y + 2$$

2. Verify that the vector $X_p = \begin{pmatrix} 1 \\ 3 \end{pmatrix}$ is a particular solution to the system in problem 1.

$$X_p' = \begin{pmatrix} 0 \\ 0 \end{pmatrix}$$

$$\Rightarrow 0 = 2(1) + 3 - 5 = 0 \checkmark \checkmark$$

$$\Rightarrow 0 = 1 - 3 + 2 = 0 \checkmark \checkmark$$

3. If $x(0) = 1$ and $y(0) = 2$, estimate the solution to the system in 1 at $t = .1$ using a step size of $\Delta t = .05$.

t	x	y	$\frac{dx}{dt}$	$\frac{dy}{dt}$	Δt	Δx	Δy
0	1	2	-1	1	.05	-.05	.05
.05	.95	2.05	-1.05	.9	.05	-.0525	.045
.1	.8975	2.095					