## MATH 246 Groupwork 1.7

## Name:

$\qquad$

1. Consider the IVP:

$$
y^{\prime}=2 y+4 t \text { with } y(0)=2
$$

(a) Use Euler's Method with $n=2$ iterations of size $h=0.5$ to approximate $y(1)$ for the IVP. Fill these in a nice table.
(b) The solution to this IVP is $y(t)=3 e^{2 t}-2 t-1$. How does your approximation compare to the exact value?
2. Consider the IVP:

$$
y^{\prime}=\frac{2 t}{y^{2}}+t \text { with } y(1)=3
$$

Suppose both the Runge-Trapezoidal and the Runge-Midpoint Methods are used to approximate $y(2)$ with $n=10$ iterations of size $h=0.1$. Fill in the values which are missing from the following tables. Even though I have lots of digits (program output) you can approximate to two decimal digits for your inputs and outputs.

Runge Trapezoidal

| $i$ | $t_{i}$ | $y_{i}$ |
| :--- | :--- | :--- |
| 0 | 1 | 3 |
| 1 | 1.1 | 3.12739516273153 |
| 2 |  | 3.26493404176817 |
| 3 | 1.3 | 3.4123878579216 |
| 4 | 1.4 |  |
| 5 | 1.5 | 3.73632928179026 |
| 6 | 1.6 | 3.91255148850797 |
| 7 |  | 4.09814888993696 |
| 8 | 1.8 | 4.29305881576136 |
| 9 | 1.9 | 4.49723899829096 |
| 10 | 2 |  |

Runge Midpoint

| $i$ | $t_{i}$ | $y_{i}$ |
| :--- | :--- | :--- |
| 0 | 1 | 3 |
| 1 | 1.1 | 3.12741099337617 |
| 2 | 1.2 | 3.2649612309732 |
| 3 | 1.3 | 3.41242233447638 |
| 4 | 1.4 | 3.56960760999894 |
| 5 | 1.5 | 3.73636820336753 |
| 6 |  | 3.91258865797772 |
| 7 | 1.7 | 4.09818233884244 |
| 8 | 1.8 | 4.29308702238228 |
| 9 |  |  |
| 10 |  |  |

