

## Example of Euler's Method

IVP:  $\frac{dy}{dx} = x^2 + y^2$

$y(0) = 1$

step size:  $h = 0.1$

| x   | y        | y'       | $\Delta y = h \cdot y'$ |
|-----|----------|----------|-------------------------|
| 0   | 1        | 1        | 0.1                     |
| 0.1 | 1.1      | 1.22     | 0.122                   |
| 0.2 | 1.222    | 1.533284 | 0.153328                |
| 0.3 | 1.375328 | 1.981528 | 0.198153                |
| 0.4 | 1.573481 | 2.635843 | 0.263584                |
| 0.5 | 1.837066 | 3.62481  | 0.362481                |
| 0.6 | 2.199547 | 5.198005 | 0.5198                  |
| 0.7 | 2.719347 | 7.884848 | 0.788485                |
| 0.8 | 3.507832 | 12.94488 | 1.294488                |
| 0.9 | 4.80232  | 23.87228 | 2.387228                |
| 1   | 7.189548 | 52.6896  | 5.26896                 |

| x  | y (h = .1) | y (h = .02) | y (h = .005) |
|----|------------|-------------|--------------|
| .1 | 1.1000     | 1.1088      | 1.1108       |
| .2 | 1.2220     | 1.2458      | 1.2512       |
| .3 | 1.3753     | 1.4243      | 1.4357       |
| .4 | 1.5735     | 1.6658      | 1.6882       |
| .5 | 1.8371     | 2.0074      | 2.0512       |
| .6 | 2.1995     | 2.5201      | 2.6104       |
| .7 | 2.7193     | 3.3612      | 3.5706       |
| .8 | 3.5078     | 4.9601      | 5.5763       |
| .9 | 4.8023     | 9.0000      | 12.2061      |
| 1  | 7.1895     | 30.9167     | 1502.2090    |