

Math Sheet

Name _____ Score _____ Teacher _____ Date _____

Euler Method Approximation

Use $y_{(n+1)} = y_n + h f(x_n, y_n)$. Round each new y-value to four decimal places and use that rounded value in the next row.

1. Use Euler's method for $y' = 1x - 1y + 1$, $y(0) = 1$, with $h = 0.5$ for 4 steps. Round each new y to four decimals.

2. Use Euler's method for $y' = -2xy - 1$, $y(0) = 1$, with $h = 0.5$ for 4 steps. Round each new y to four decimals.

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Euler Method Approximation

Use $y_{(n+1)} = y_n + h f(x_n, y_n)$. Round each new y-value to four decimal places and use that rounded value in the next row.

3. Use Euler's method for $y' = 1xy + 1$, $y(0) = 1$, with $h = 0.5$ for 4 steps. Round each new y to four decimals.

4. Use Euler's method for $y' = 2x + 0y + 2$, $y(0) = 1$, with $h = 0.5$ for 4 steps. Round each new y to four decimals.

Euler Method Approximation

Worked Answer Key

Use $y_{(n+1)} = y_n + h f(x_n, y_n)$. Round each new y-value to four decimal places and use that rounded value in the next row.

1. Use Euler's method for $y' = 1x - 1y + 1$, $y(0) = 1$, with $h = 0.5$ for 4 steps. Round each new y to four decimals.

Answer: y(2) is approximately 2.0625.

1. Use $y_{(n+1)} = y_n + 0.5 f(x_n, y_n)$ and $x_{(n+1)} = x_n + 0.5$.

2. n=0: (0, 1), f=0, $y_{next}=1$; n=1: (0.5, 1), f=0.5, $y_{next}=1.25$; n=2: (1, 1.25), f=0.75, $y_{next}=1.625$; n=3: (1.5, 1.625), f=0.875, $y_{next}=2.0625$

3. After 4 recurrence rows, x = 2 and y is approximately 2.0625.

4. This is a numerical approximation; it is not asserted to be an exact solution value.

2. Use Euler's method for $y' = -2xy - 1$, $y(0) = 1$, with $h = 0.5$ for 4 steps. Round each new y to four decimals.

Answer: y(2) is approximately -0.25.

1. Use $y_{(n+1)} = y_n + 0.5 f(x_n, y_n)$ and $x_{(n+1)} = x_n + 0.5$.

2. n=0: (0, 1), f=-1, $y_{next}=0.5$; n=1: (0.5, 0.5), f=-1.5, $y_{next}=-0.25$; n=2: (1, -0.25), f=-0.5, $y_{next}=-0.5$; n=3: (1.5, -0.5), f=0.5, $y_{next}=-0.25$

3. After 4 recurrence rows, x = 2 and y is approximately -0.25.

4. This is a numerical approximation; it is not asserted to be an exact solution value.

Euler Method Approximation

Worked Answer Key

Use $y_{(n+1)} = y_n + h f(x_n, y_n)$. Round each new y -value to four decimal places and use that rounded value in the next row.

3. Use Euler's method for $y' = 1xy + 1$, $y(0) = 1$, with $h = 0.5$ for 4 steps. Round each new y to four decimals.

Answer: $y(2)$ is approximately 7.6094.

1. Use $y_{(n+1)} = y_n + 0.5 f(x_n, y_n)$ and $x_{(n+1)} = x_n + 0.5$.

2. $n=0$: (0, 1), $f=1$, $y_{next}=1.5$; $n=1$: (0.5, 1.5), $f=1.75$, $y_{next}=2.375$; $n=2$: (1, 2.375), $f=3.375$, $y_{next}=4.0625$; $n=3$: (1.5, 4.0625), $f=7.09375$, $y_{next}=7.6094$

3. After 4 recurrence rows, $x = 2$ and y is approximately 7.6094.

4. This is a numerical approximation; it is not asserted to be an exact solution value.

4. Use Euler's method for $y' = 2x + 0y + 2$, $y(0) = 1$, with $h = 0.5$ for 4 steps. Round each new y to four decimals.

Answer: $y(2)$ is approximately 8.

1. Use $y_{(n+1)} = y_n + 0.5 f(x_n, y_n)$ and $x_{(n+1)} = x_n + 0.5$.

2. $n=0$: (0, 1), $f=2$, $y_{next}=2$; $n=1$: (0.5, 2), $f=3$, $y_{next}=3.5$; $n=2$: (1, 3.5), $f=4$, $y_{next}=5.5$; $n=3$: (1.5, 5.5), $f=5$, $y_{next}=8$

3. After 4 recurrence rows, $x = 2$ and y is approximately 8.

4. This is a numerical approximation; it is not asserted to be an exact solution value.