

Euler's Method AP Practice

1. Consider the differential equation $\frac{dy}{dx} = y^2(2x + 2)$. Let $y = f(x)$ be the particular solution to the differential equation with initial condition $f(0) = -1$.

Use Euler's method, starting at $x = 0$ with two steps of equal size, to approximate $f\left(\frac{1}{2}\right)$.

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2. The function f is twice differentiable for $x > 0$ with $f(1) = 15$ and $f''(1) = 20$. Values of f' , the derivative of f , are given for selected values of x in the table below.

x	1	1.1	1.2	1.3	1.4
$f'(x)$	8	10	12	13	14.5

Use Euler's method, starting at $x = 1$ with two steps of equal size, to approximate $f(1.4)$. Show the computations that lead to your answer.

3. Consider the differential equation $\frac{dy}{dx} = 1 - y$. Let $y = f(x)$ be the particular solution to the differential equation with initial condition $f(1) = 0$. For this particular solution, $f(x) < 1$ for all values of x .

Use Euler's method, starting at $x = 0$ with two steps of equal size, to approximate $f(0)$. Show the work that leads to your answer.

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4. Consider the differential equation $\frac{dy}{dx} = 6x^2 - x^2y$. Let $y = f(x)$ be the particular solution to the differential equation with initial condition $f(-1) = 2$.

Use Euler's method with two steps of equal size, starting at $x = -1$, to approximate $f(0)$. Show the work that leads to your answer.
