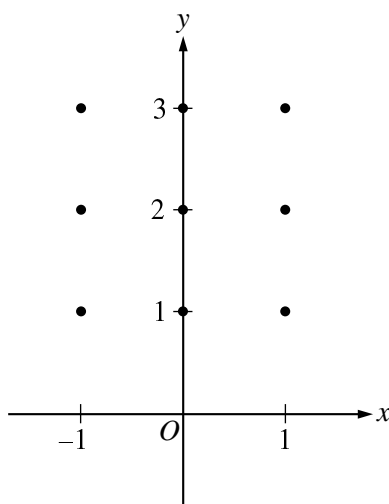


1998 Calculus BC Free-Response Questions

4. Consider the differential equation given by $\frac{dy}{dx} = \frac{xy}{2}$.

- (a) On the axes provided below, sketch a slope field for the given differential equation at the nine points indicated.



- (b) Let $y = f(x)$ be the particular solution to the given differential equation with the initial condition $f(0) = 3$. Use Euler's method starting at $x = 0$, with a step size of 0.1, to approximate $f(0.2)$. Show the work that leads to your answer.
- (c) Find the particular solution $y = f(x)$ to the given differential equation with the initial condition $f(0) = 3$. Use your solution to find $f(0.2)$.
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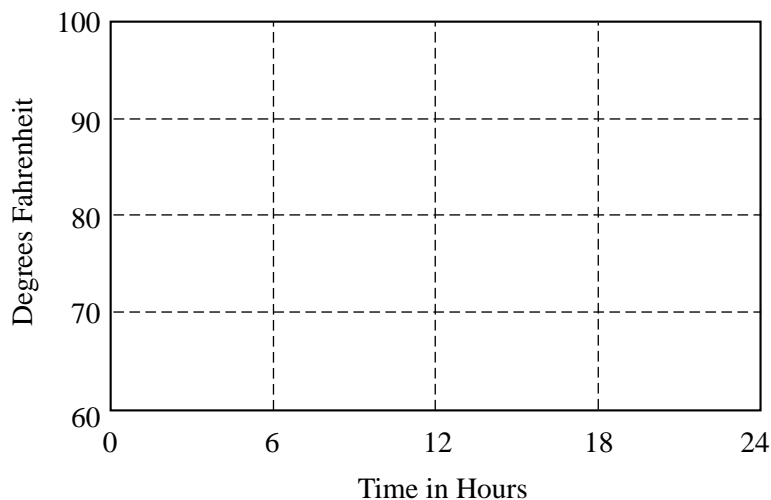
1998 Calculus BC Free-Response Questions

5. The temperature outside a house during a 24-hour period is given by

$$F(t) = 80 - 10 \cos\left(\frac{\pi t}{12}\right), \quad 0 \leq t \leq 24,$$

where $F(t)$ is measured in degrees Fahrenheit and t is measured in hours.

- (a) Sketch the graph of F on the grid below.



- (b) Find the average temperature, to the nearest degree Fahrenheit, between $t = 6$ and $t = 14$.
- (c) An air conditioner cooled the house whenever the outside temperature was at or above 78 degrees Fahrenheit. For what values of t was the air conditioner cooling the house?
- (d) The cost of cooling the house accumulates at the rate of \$0.05 per hour for each degree the outside temperature exceeds 78 degrees Fahrenheit. What was the total cost, to the nearest cent, to cool the house for this 24-hour period?
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