

SOLUTION: Problem 4S10

If $C(x)$ is identically zero, then the remaining two terms that involve only the derivatives of $Y(x)$. For this reason, the differential equation can not distinguish $Y(x)$ from $Y(x) + C$ - the constant C will not appear in the equation. This means that it is necessary for the boundary conditions to distinguish between the two solutions. However, this is only possible if at least one of the boundary conditions specifies a value for $y(x)$ rather than its derivative.

If $C(x) \neq 0$, then the constant C will appear in the equation due to that term, and the solution will be unique even if $y(x)$ is not specified directly as a boundary condition.