

Feedback

This will be updated with some interesting (!) questions posed by the students.

Q1. About the singular solution in Lecture I:

$y = cx - c^2$ is the general solution of $y'^2 - xy' + y = 0$ and $y_s(x) = x^2/4$ is the singular solution. Suppose $z(x) = cx - c^2 + x^2/4$. Now $z(x)$ has one arbitrary constant and we can obtain $y_s(x)$ from $z(x)$ by taking $c = 0$. Thus, $y_s(x)$ is a particular solution of $z(x)$! Why then $y_s(x)$ is called singular?

A1. It is true that $y_s(x)$ is a particular solution of $z(x)$. But $z(x)$ is NOT the general solution of $y'^2 - xy' + y = 0$. Verify yourself. Note that $z(x)$ is not the general solution of the original equation because the original equation is *nonlinear*. Hence, superimposition of two solutions will be a solution does not hold for nonlinear problem. But it is definitely true for linear problems.