1. We should take $\boxed{y = e^{rt}}$ since the Diff. Eq is.
   1) Linear
   2) Homogeneous
   3) Constant Coefficient

Then

$$\boxed{3r^3 + 9r - 30 = 0}$$

$$\boxed{r^3 + 3r - 10 = 0}$$

The roots to this eqtn are: r_1, r_2, so that

$\boxed{y(t) = C_1 e^{r_1 t} + C_2 e^{r_2 t}}$ is the solution.

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2. We look for solutions of the form: $y = t^n$

so $t^2 \frac{d^2}{dt^2} y + t \frac{dy}{dt} - 9y = 0$

because

$$t^2 n(n-1) t^{n-2} + t n t^{n-1} - 9t^n = 0$$

$$n(n-1) t^n + n t^n - 9t^n = 0$$

$$n(n-1) + n - 9 = 0$$

$$n^2 - n + n = 9$$

$$n^2 = 9$$

Then, $n = 3$, $n = -3$, and the solution is

$$\boxed{y(t) = C_1 t^3 + \frac{C_2}{t^3}}$$

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ANSWER KEY.

(1) La Ec. Dif es:
1) Lineal
2) Coef. Const
3) Homogénea

} Admite solución: $y(t) = e^{rt}$.

$$3\frac{d^2}{dt^2}y + 9\frac{dy}{dt} - 30y = 0 \Rightarrow r^2 + 3r - 10 = 0$$

$$\Rightarrow (r+5)(r-2) = 0 \Rightarrow \begin{array}{l} r_1 = -5 \\ r_2 = 2. \end{array}$$

Solución: $\boxed{y(t) = C_1 e^{-5t} + C_2 e^{2t}}$

(2) Buscar soluciones de la forma: $y(t) = t^n$, y substituir en

$$t^2\frac{d^2}{dt^2}y + t\frac{dy}{dt} - 9y = 0.$$

$$t^2 n(n-1)t^{n-2} + t\,n\,t^{n-1} - 9t^n = 0$$

$$\Rightarrow n(n-1) + n - 9 = 0 \Rightarrow n^2 - n + n - 9 = 0$$

$$\Rightarrow n^2 = 9 \Rightarrow \begin{array}{l} n_1 = 3 \\ n_2 = -3 \end{array}$$

Entonces, la solución es:

$$\boxed{y(t) = C_1 t^3 + \frac{C_2}{t^3}}$$