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CPE - 201

5. (A.) $(y-x)y' = y - x + 8$, $y = x + 4\sqrt{x+2}$

$$\frac{d}{dx}\left(x + 4\sqrt{x+2}\right) = \frac{d}{dx}x + \frac{d}{dx}4\sqrt{x+2}$$

$$= \frac{d}{dx}x + \frac{d}{dx}4(x+2)^{1/2}$$

$$= 1 + 4\left(\frac{1}{2}\right)(x+2)^{-1/2}$$

$$\frac{d}{dx} = 1 + 2(x+2)^{-1/2}$$

$$\boxed{\frac{d}{dx} = 1 + \frac{2}{\sqrt{x+2}}} \quad //$$

Substitute:

$$(x + 4\sqrt{x+2} - x)\left(1 + \frac{2}{\sqrt{x+2}}\right) = x + 4\sqrt{x+2} - x + 8$$

$$4\sqrt{x+2} + \left(4\sqrt{x+2}\right)\left(\frac{2}{\sqrt{x+2}}\right) = 4\sqrt{x+2} + 8$$

$$\boxed{4\sqrt{x+2} + 8 = 4\sqrt{x+2} + 8}$$

it is a solution

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5.

(B)

$y = x^m$, $x^2 y'' - 7x y' + 15y = 0$

$\frac{d}{dx} y' = mx^{m-1}$.

$\frac{d}{dx} y'' = m^2 x^{m-2} - mx^{m-2}$.

substitution :

$x^2 (m^2 x^{m-2} - mx^{m-2}) - 7x (mx^{m-1}) + 15 (x^m) = 0$

$m^2 x^m - mx^m - 7mx^m + 15x^m = 0$

$x^m (m^2 - m - 7m + 15) = 0$

$x^m (m-3)(m-5) = 0$ → $m = 3$ and $m = 5$

therefore

$y = x^3$ and $y = x^5$ //