Suggested problems 14

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1. Determine the longest interval in which the given initial value problem is certain to have a unique solution

$$(t+2)y'' - \sin(t)y' + \frac{ty}{t-4} = \frac{e^{2t}}{t}, \qquad y(-1) = 0, \qquad y'(-1) = 1.$$

2. Find the Wronskian of the given pair of functions

   (a) $e^{2t}, \quad e^{-3t}$;

   (b) $e^t \sin(t), \quad e^t \cos(t)$.

3. Let y_1 and y_2 be two solutions to the linear equation

$$2t^2y'' - ty' - y = 0.$$

   A constant multiple of which function is the Wronskian of y_1 and y_2.

4. Let y_1, y_2 be two solutions to the equation $ty'' - 2y' - y = 0$.

   (a) Determine the Wronskian $W(y_1, y_2)$ of y_1 and y_2.

   (b) If $W(y_1, y_2)(2) = 1$, then determine $W(y_1, y_2)(3)$.