1_a. Find the general solution of the differential equation: $y'' + 2y' + 3y = 0$.

Answer: _____

1_b. Solve the following initial value problem: $y'' + 4y = t^2 + 3e^t$, $y(0) = 0$, $y'(0) = 0$.

Answer: _____

2. Find the general solution of the differential equation: $ty'' + y' = t$, $t > 1$.

Answer: _____

3. Find the general solution of the differential equation: $y'' - 10y' + 25y = x^{-2}e^{5x}$, $x > 0$.

Answer: _____

4_a. If the Wronskian of f and g is $W(f,g) = x^2 \cos x$ and if $u = f+g$ and $v = f-g$, find the Wronskian of u and v.

Answer: _____

4_b. Suppose that $y'' - ty = \cos t$ and that $y(0) = 1$ and $y'(0) = \pi$. Find $y'''(0)$.

Answer: _____

4

5. A mass m stretches a spring 2 ft. If the mass is set in motion from its equilibrium position with a downward velocity of 16 ft/sec and if there is no air resistance or other damping factors, determine the position of the mass at any time. What is the period of the motion? (Assume the gravitational constant $g = 32$ ft/sec^2).

Answer: _____

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