QUIZ 2 FOR CALC 4 ON SEPT. 11, 2014

Name(PRINT!): Solution RUID: _____

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Find the solution of the initial value problem

$$t^2y'(t) + 2ty(t) = \cos t, y(\pi) = 0, t > 0$$

Check your solutions!

1. Standard form: $y' + \frac{2}{t}y = \frac{\cos t}{t^2}$.

2. Int. factor: $\mu(t) = \exp\left(\int \frac{2}{t}\,dt\right) = \exp(2\ln|t|)$

$= t^2$.

3. Gen. sol'n: $\int t^2 \cdot \frac{\cos t}{t^2}\,dt = \int \cos t\,dt = \sin t + C$.

So $y(t) = \frac{\sin t + C}{t^2}$.

4. Find C: $y(\pi) = \frac{\sin \pi + C}{\pi^2} = \frac{C}{\pi^2} = 0$.

$\Rightarrow C = 0 \Rightarrow y(t) = \frac{\sin t}{t^2}$.

5. Check: (a) $y(\pi) = \frac{\sin \pi}{\pi^2} = 0$. ✓

(b) $y'(t) = \left(\frac{1}{t^2}\sin t\right)' = -\frac{2}{t^3}\sin t + \frac{1}{t^2}\cos t$.

$y'(t) + \frac{2}{t}y(t) = -\frac{2}{t^3}\sin t + \frac{1}{t^2}\cos t + \frac{2}{t}\cdot\frac{\sin t}{t^2} = \frac{\cos t}{t^2}$ ✓