MATH 209: HW DUE MAY 13

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Question 1 (40 points) : Find the Laplace Transforms of: (1) $\cos(2t)$; (2) $4t^7 - 11t^3 + 1$; (3) $t^2 e^{3t}$; (4) $\cosh(t) = \frac{e^t + e^{-t}}{2}$.

Question 2 (30 points) : Find the Inverse Laplace Transform of the following (the table in the book or online at `http://en.wikipedia.org/wiki/Laplace_transforms#Table_of_selected_Laplace_transforms` might be useful): (1) $F(s) = \frac{3}{s^2+4}$; (2) $F(s) = \frac{2}{s^2+3s-4}$; (3) $F(s) = \frac{8s^2-4s+12}{s(s^2+4)}$.

Question 3 (10 points) : Use the Laplace transform to solve $y'' - y' - 6y = 0$ with $y(0) = 1$, $y'(0) = -1$.

Question 4 (10 points) : Use the Laplace transform to solve $y'''' - 4y = 0$ with $y(0) = 1$, $y'(0) = 0$, $y''(0) = 2$ and $y'''(0) = 0$. (NOTE: for those looking for additional problems, #17 from Section 6.2 is a good one.)

Question 5 (10 points) : Solve $y'' + y = f(t)$, where $f(t) = 1$ for $0 \leq t < 3\pi$ and 0 if $3\pi \leq t < \infty$ and subject to the initial conditions $y(0) = 0$ and $y'(0) = 1$.