MATH 2171 **Test III** **Fall 2001**

Name : _____

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1. Find the Laplace transform $\mathcal{L}(f)$ of the following functions:

   (a) $f(t) = 3 + t^2 + \cos 3t$;

   (b) $f(t) = e^{-t} \sin 2t + t \sin t$;

   (c) $f(t) = e^{3t}u(t-2) + \cos^2 t$.

   (d) $f(t) = \begin{cases} t, & \text{if } 0 \leq t < 4, \\ 0, & \text{if } 4 \leq t. \end{cases}$

2. Find $f(t)$ if $F(s) = \mathcal{L}(f)$ equals

(a) $F(s) = \dfrac{1}{s^2} + \dfrac{1}{s^2+4} + \dfrac{1}{s^2-4}$;

(b) $F(s) = \dfrac{3s+4}{s^2+25} + \dfrac{3s+4}{s^2+6s+25}$;

(c) $F(s) = \dfrac{1}{s^3-3s^2+2s}$;

(d) $F(s) = \dfrac{4s-2e^{-3s}}{s^2+4}$.

3. Solve the initial-value problem

$$x'' + 9x = 6\delta(t-4), \quad x(0) = 0, \quad x'(0) = 1.$$

4. Solve the initial-value problem

$$x'' - 6x' + 25x = 0, \quad x(0) = 1, x'(0) = 2.$$