Math 217 - November 2, 2010

$$\mathcal{L}\left\{e^{at}\right\} = \frac{1}{s-a} \qquad \mathcal{L}\left\{t^n\right\} = \frac{n!}{s^{n+1}}$$
$$\mathcal{L}\left\{t^a\right\} = \frac{\Gamma(a+1)}{s^{a+1}} \qquad \mathcal{L}\left\{u_a(t)\right\} = \frac{e^{-sa}}{s}$$
$$\mathcal{L}\left\{\cosh(at)\right\} = \frac{s}{s^2-a^2} \qquad \mathcal{L}\left\{\sinh(at)\right\} = \frac{a}{s^2-a^2}$$
$$\mathcal{L}\left\{\cos(at)\right\} = \frac{s}{s^2+a^2} \qquad \mathcal{L}\left\{\sin(at)\right\} = \frac{a}{s^2+a^2}$$
$$\mathcal{L}\left\{f'(t)\right\} = s\,F(s) - f(0)$$
$$\mathcal{L}\left\{f''(t)\right\} = s^2\,F(s) - sf(0) - f'(0)$$

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1. Use the Laplace Transform to solve $y' - 2y = t^2, \quad y(0) = 3$
2. Use the Laplace Transform to solve $y' + 5y = e^{-t}, \quad y(0) = 5$

Lecture Problems

3. Solve the equation using the Laplace transform

   $$x'' - 3x' + 2x = 12e^{-t}, \quad x(0) = 1, x'(0) = 2$$

4. Solve the system using the Laplace Transform

   $$x' = x + y \qquad x(0) = 0$$
   $$y' = 3x - y \qquad y(0) = 2$$