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18.034 Honors Differential Equations  
Spring 2009

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## 18.034 Recitation: April 2nd, 2009

1. Find the rest solution to the ODE

$$y' + 2y = e^{3t}.$$

2. (a) Suppose  $|f(t)| \leq C|e^{at}|$  for some  $a > 0$ . Show that if  $F(s) = Q(s)/P(s)$  for polynomials  $P$  and  $Q$ , then  $\deg P > \deg Q$ .  
(b) Show that if  $|f'(t)| \leq Ce^{at}$  then  $\lim_{s \rightarrow \infty} sF(s) = f(0)$ .

3. Find the Laplace transforms of

(a)  $f(t) = \cosh t \sin t$ ,

(b)

$$g(t) = \int_0^t \frac{\sin \theta}{\theta} d\theta,$$

(c)  $h(t) = e^{-t^2}$  (in as explicit a form as you can).

4. Find the inverse transform of

$$F(s) = \frac{2s^3 + 6s^2 + 21s + 52}{s(s+2)(s^2 + 4s + 13)}.$$