Tasks for this class
A. Briefly discuss Exam 2
B. Laplace Transform [Ch2, Sec9]
(1) [Q2] 
Show that \( \mathcal{L}[x^2 e^x](s) = \frac{2}{(s-1)s} \).

(2) [Q3] 
Show that \( \mathcal{L}[\cos(t)](s) = \frac{s}{s^2+1} \).

(3) Find the function which has the given Laplace Transform [Q6-9]
i. \( Y(s) = \frac{e^{-\pi s}}{s^2+2s+2} \)
ii. \( Y(s) = \frac{s+1}{s^2-s-6} \)
iii. \( Y(s) = \frac{s}{s^2 + 2s + 2} \)
iv. \( Y(s) = \frac{8}{s(s^2 - 4)} \)

(4) Solve the given initial value problems using the Laplace Transform [Q12] 
\[ y'' + 4y' - 21y = 0 \text{ where } y(0) = 2 \text{ and } y'(0) = 3. \]

(5) Solve the given initial value problems using the Laplace Transform [Q13] 
\[ y'' - y' - 2y = 4xe^{x}; \ y(0) = 2; \ y'(0) = 0. \]

Useful Information
- Problem Set E. Due November 10. See course website for details.