

1. Find the inverse Laplace transform of each of the following functions:

Use the mixed method and the tables.

$$a) F(s) = \frac{2 \cdot s}{s^2 + 2 \cdot s + \frac{5}{4}}$$

$$b) F(s) = \frac{8 \cdot s + 4}{s^2 \cdot (s + 1)^2}$$

$$c) F(s) = \frac{\frac{1}{2} \cdot s^3 + s^2 + s + \frac{5}{2}}{s^2 \cdot (s^2 + 2 \cdot s + 5)}$$

$$2. F(s) = \frac{s - 1}{s^3 \cdot (s^2 + 2 \cdot s + 5)^2}$$

Show the form of $f(t)$ without actually finding it.
Indicate which of the coefficients may not be 0

3. Problem 2.3a - f in textbook (p.20)

As part of your work to reach a solution, draw the pole diagram for each.

Answers (time functions below valid for $t \geq 0$ only)

$$1. a) 2 \cdot e^{-t} \cdot \cos\left(\frac{1}{2} \cdot t\right) - 4 \cdot e^{-t} \cdot \sin\left(\frac{1}{2} \cdot t\right) \quad b) 4 \cdot t - 4 \cdot t \cdot e^{-t} \quad c) \frac{1}{2} \cdot t + \frac{1}{2} \cdot e^{-t} \cdot \cos(2 \cdot t)$$

$$2. A + B \cdot t + C \cdot t^2 + \sqrt{E^2 + F^2} \cdot e^{at} \cdot \cos(b \cdot t + \theta) + \sqrt{G^2 + H^2} \cdot t \cdot e^{at} \cdot \cos(b \cdot t + \phi)$$

Can't be 0: C & $\sqrt{G^2 + H^2}$

Alternate solution:

$$A + B \cdot t + C \cdot t^2 + E \cdot e^{at} \cdot \cos(b \cdot t) + F \cdot e^{at} \cdot \sin(b \cdot t) + G \cdot t \cdot e^{at} \cdot \cos(b \cdot t) + H \cdot t \cdot e^{at} \cdot \sin(b \cdot t)$$

C may not be 0 & Either G or H may be 0, but not both

3.	<u>Bounded</u>	<u>Converges</u>	<u>$f(\infty)$</u>
a)	yes	yes	0
b)	yes	yes	$-\frac{1}{2}$
c)	no		
d)	yes	yes	5
e)	yes	no	
f)	no		