Sinyal dan Sistem - ACP 4 - 24 Nov

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[9.8.9] Given a feedback system where $H_1(s) = 1/(s+1)$ in the forward path and $H_2(s) = 2$ in the feedback path, and the feedback signal is subtracted from the input. What is the overall system function $H(s) = Y(s)/X(s)$?

A. $\frac{1}{s+3}$
B. $\frac{1}{s-1}$
C. $\frac{2}{s+1}$
D. $\frac{s+1}{s+3}$

[9.8.3] For a feedback interconnection where the output of $H_2(s)$ is subtracted from the input $X(s)$ before entering $H_1(s)$, what is the overall system function $H(s) = Y(s)/X(s)$?

A. $H(s) = H_1(s) + H_2(s)$
B. $H(s) = H_1(s)H_2(s)$
C. $H(s) = \frac{H_1(s)}{1-H_1(s)H_2(s)}$
D. $H(s) = \frac{H_1(s)}{1+H_1(s)H_2(s)}$

[9.1.13] In a rational Laplace transform $X(s) = N(s)/D(s)$, what are the roots of the denominator polynomial $D(s)$ called?

A. Poles of $X(s)$
B. Zeros of $X(s)$
C. Critical points
D. Eigenvalues

[9.1.1] What is the general term for the integral $H(s) = \int_{-\infty}^{\infty} h(t)e^{-st}dt$?

A. Fourier Transform
B. Convolution Integral
C. Laplace Transform
D. Z-Transform

[9.1.4] If the complex variable s is purely imaginary ($s = j\omega$), what does the Laplace transform $X(s)$ become?

A. The inverse Fourier transform of $x(t)$
B. The Fourier transform of $x(t)$
C. The convolution of $x(t)$
D. The Z-transform of $x(t)$

[9.1.16] How are zeros typically marked on an s-plane plot?

A. With a circle (o)
B. With a star (*)
C. With an x (x)
D. With a square ( )

[9.1.10] On the s-plane, which axis represents the real part of s?

A. The $j\omega$-axis
B. The t-axis
C. The σ-axis
D. The z-axis

[9.1.7] For the signal $x(t) = e^{-at}u(t)$, under what condition does its Laplace transform converge?

A. $\text{Re}\{s\} < a$
B. $\text{Re}\{s\} > -a$
C. $\text{Re}\{s\} = 0$
D. $\text{Re}\{s\} < -a$

[9.2.7] For a rational Laplace transform $X(s)$ corresponding to a left-sided signal $x(t)$, the ROC is the region in the s-plane:

A. To the left of the leftmost pole.
B. To the right of the rightmost pole.
C. Between the leftmost and rightmost poles.
D. The entire s-plane.

[9.3.4] If the Region of Convergence (ROC) for a rational Laplace transform $X(s)$ is to the right of the rightmost pole, what type of signal is $x(t)$?

A. Left-sided
B. Two-sided
C. Right-sided
D. Finite duration

[9.1.19] For the Laplace transform in Example 9.5, $X(s) = \frac{(s-1)^2}{(s+1)(s-2)}$, does the Fourier transform of the corresponding $x(t)$ converge?

A. Yes, because the ROC includes the $j\omega$-axis.
B. No, because the ROC does not include the $j\omega$-axis.
C. It depends on the value of s.
D. Only for specific values of t.

[9.3.10] If the ROC of $X(s)$ is $\text{Re}\{s\} > -1$, does the Laplace transform of $x(t)$ exist?

A. Yes
B. No
C. Only if $X(s)$ is non-rational
D. Only if $x(t)$ is a finite duration signal

[9.5.5] If $x_1(t) \leftrightarrow X_1(s)$ and $x_2(t) \leftrightarrow X_2(s)$, what is the Laplace transform of their convolution $x_1(t) * x_2(t)$?
A. $X_1(s) + X_2(s)$
B. $X_1(s)/X_2(s)$
C. $X_1(s)X_2(s)$
D. $sX_1(s)X_2(s)$

[9.2.3] Can the Region of Convergence (ROC) for a rational Laplace transform contain any poles?
A. Yes, always
B. No, because $X(s)$ is infinite at poles
C. Only if the signal is finite duration
D. Only if the signal is right-sided

[9.2.4] If $x(t)$ is a left-sided signal, and its Laplace transform converges, what is the nature of its Region of Convergence (ROC)?
A. A right-half plane, $\text{Re}\{s\} > \sigma_0$
B. A left-half plane, $\text{Re}\{s\} < \sigma_0$
C. A strip parallel to the $j\omega$-axis
D. The entire s-plane

[9.3.1] What is the basic equation for the inverse Laplace transform $x(t)$?
A. $x(t) = \frac{1}{2\pi j} \int_{-\infty}^{+\infty} X(s)e^{st}ds$
B. $x(t) = \frac{1}{2\pi j} \int_{\sigma-j\infty}^{\sigma+j\infty} X(s)e^{st}ds$
C. $x(t) = \int_{-\infty}^{+\infty} X(s)e^{st}ds$
D. $x(t) = \frac{1}{2\pi} \int_{-\infty}^{+\infty} X(s)e^{j\omega t}d\omega$

[9.3.7] Given $X(s) = \frac{1}{(s+1)(s+2)}$ with ROC $\text{Re}\{s\} > -1$, what is the partial-fraction coefficient A for the term $\frac{A}{s+1}$?
A. -1
B. 1
C. 2
D. -2

[9.5.2] If $x(t) \leftrightarrow X(s)$ with ROC R, what is the Laplace transform of $x(t - t_0)$?
A. $e^{st_0}X(s)$
B. $e^{-st_0}X(s)$
C. $X(s - t_0)$
D. $X(s + t_0)$

[9.7.2] What is the common term used for $H(s)$ in the context of Laplace transforms for LTI systems?
A. Frequency response
B. Transfer function
C. Impulse response
D. Step response

[9.7.5] An LTI system is stable if and only if the ROC of its system function $H(s)$ includes which part of the s-plane?
A. The entire real axis.
B. The entire imaginary axis ($j\omega$-axis).
C. The left-half plane.
D. The right-half plane.

[9.7.8] If an LTI system is characterized by a linear constant-coefficient differential equation, what can be generally said about its system function $H(s)$?
A. It is always an exponential function.
B. It is always a rational function of s.
C. It is always a polynomial in s.
D. It is always a constant.

[9.7.11] An LTI system is known to be causal and has poles at $s = -3$ and $s = 2$. Is this system stable?
A. Yes, because it is causal.
B. No, because it has a pole in the right-half plane.
C. Yes, because its poles are real.
D. Insufficient information to determine stability.

[9.8.6] If a system function $H(s)$ is expressed as a sum of simpler system functions using partial-fraction expansion, which block diagram representation is suggested?
A. Direct form
B. Parallel form
C. Cascade form
D. Series form