

L^AT_EX Examples

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1 Math

Question 1. Suppose that an LTI system function

$$H(z) = 1 + 5z^{-1} - 3z^{-2} + 2.5z^{-3} + 4z^{-8}$$

a) Determine the difference equation that relates the output $y[n]$ of the system to the input $x[n]$

b) Determine and plot the output sequence $y[n]$ when the input is $x[n] = \delta[n]$

$$\frac{Y(z)}{X(z)} = H(z) \Rightarrow \frac{y[n]}{x[n]} = h[n] = \delta[n] + 5\delta[n-1] - 3\delta[n-2] + \dots$$

$$y[n] = x[n] + 5x[n-1] - 3x[n-2] + 2.5x[n-3] + 4x[n-8]$$

$$\text{When } x[n] = \delta[n] \rightarrow y[n] = h[n]$$

$$y[n] = [1, 5, -3, 2.5, 0, 0, 0, 0, 4]$$

Question 2. Find the volume under the hyperbolic paraboloid over $R = [-1, 1] \times [1, 2]$

$$z = 3y^2 - x^2 + 2$$

$$\begin{aligned} \int_1^2 \int_{-1}^1 3y^2 - x^2 dx dy &= \int_1^2 3y^2 x - \frac{1}{3}x^3 + 2x \Big|_{-1}^1 dy \\ \int_1^2 3y^2 - \frac{1}{3} + 2 + (3y^2 + \frac{1}{3} + 2) dy &= \int_1^2 6y^2 + \frac{10}{3} dy \\ 2y^3 + \frac{10}{3}y \Big|_1^2 &= 16 + \frac{20}{3} - 2 - \frac{10}{3} \\ 14 + \frac{10}{3} &= \frac{52}{3} \end{aligned}$$

Question 3. Give an expression for $y(x, t)$ for a sinusoidal wave traveling along a string in the negative x direction, given that $y_{max} = 40$, $\lambda = 40$, $f = 10$ Hz, and

$$\text{a) } y(0, 0) = 0$$

$$\text{b) } y(3.75, 0) = 0$$

$$\text{a) } y(x, t) = A \cos(\omega t + \frac{2\pi}{\lambda}x + \phi)$$

$$y(x, t) = 40 \cos(2\pi 10t + \frac{2\pi}{30}x + \phi)$$

$$y(0, 0) = 0 = 40 \cos(\phi)$$

$$\Rightarrow \phi = \frac{\pi}{2}, y(x, t) = 40 \sin(2\pi 10t + \frac{\pi}{15}x)$$

$$\text{b) } y(3.75, 0) = 3.75 = 40 \cos(\frac{\pi}{15}3.75 + \phi)$$

$$\Rightarrow \phi = .220\pi, y(x, t) = 40 \cos(2\pi t + \frac{\pi}{15}x + .220\pi)$$

2 Section2

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2.2 Subsection 2

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3 List

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¹ Lorem ipsum sorced from: ipsum.com

² This is a footnote

4 Images

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practitioner silo driver industry leader capability dot-bomb low hanging fruit



Figure 1: The GW Tech Collective Logo

team player executive search synergy agile workflow ballpark figure enterprise
core competency proposition stakeholder alignment big data cloud action point
bandwidth standpoint brand vertical platform

L^AT_EX L^AT_EX 2_ε

(a) L^AT_EX logo

(b) L^AT_EX 2_ε logo

Figure 2: Use the `subcaption` package, and Google to figure out how to make subfigures

5 Tables

f	f(x)
0	2
1	4
2	6
3	8
4	10

Table 1: $f(x) = 2x + 2$

1	2	3000
4	5	6000
7	8	9000

Table 2: Table with no borders

Assets		Balance Sheet	
		Liabilities	
Cash	12,000	Notes Payable	45,500
Accounts Receivable	24,500	Accounts Payable	7,500
Inventory	37,020	Salaries Payable	3,250
Furniture	8,000	Taxes Payable	1,275
Total Assets	<u>81,520</u>	Total Liabilities	<u>57,525</u>
		Owner's Equity	
		Retained Earnings	<u>23,995</u>
		Total Owner's Equity	<u>23,995</u>
		Total Liabilities and Owner's Equity	<u>81,520</u>