

MAT 321

Quiz 3

Spring 2026

1. Consider the following system (or filter), with domain of input signals understood to be those signals \mathbf{x} for which the output \mathbf{y} is defined for all t :

$$y_t = \sum_{k=-100}^t x_k, \quad t \geq -100, \quad y_t = x_t, \quad t < -100.$$

Which of the following input signals are NOT in the domain of this system? (Assume the definition holds for all t , unless indicated otherwise.)

i) $x_t = (-1)^t$ ii) $x_t = \frac{(-1)^t}{t}, x_0 = 0.$ iii) $x_t = t, t \geq 0, x_t = 0, t < 0.$

- a) i) and ii) only b) none of them c) iii) only d) ii) only e) i) only

Correct Answer: none of them

2. Same system and signals as in the previous problem. Which of the input signals will have unbounded output?

- a) i) and ii) only b) none of them c) iii) only d) ii) only e) i) only

Correct Answer: iii) only

3. Consider the following system (or filter), with domain of input signals understood to be those signals \mathbf{x} for which the output \mathbf{y} is defined for all t :

$$y_t = \sum_{k=-\infty}^t x_k.$$

Which of the following input signals are NOT in the domain of this system? (Assume the definition holds for all t , unless indicated otherwise.)

i) $x_t = (-1)^t$ ii) $x_t = \frac{1}{t}, x_0 = 0.$ iii) $x_t = t, t \geq 0, x_t = 0, t < 0.$

- a) i) and ii) only b) none of them c) iii) only d) ii) only e) i) only

Correct Answer: i) and ii) only

4. Same system as in the previous problem. Which of the following input signals will have unbounded output?

i) $x_t = \frac{(-1)^t}{t}, x_0 = 0$ ii) $x_t = \frac{1}{t}, t > 0, x_t = 0, t \leq 0.$ iii) $x_t = 2^t, t < 0, x_t = 0, t \geq 0.$

- a) i) and ii) only b) ii) and iii) only c) iii) only d) ii) only e) i) only

Correct Answer: ii) only

5. Same system as in the previous problem. Which of the following properties are true for this system?

i) linear ii) time invariant iii) BIBO

- a) i) and ii) only b) ii) and iii) only c) i) and iii) only d) i) only e) iii) only

Correct Answer: i) and ii) only