UJIAN AKHIR SEMESTER

MATEMATIKA INFORMATIKA

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FAKULTAS MATEMATIKA DAN ILMU PENGETAHUAN ALAM

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1. **Tentukan nilai eigen dari matriks A =**

**Jawab :**

Nilai eigen dari matriks A =

* A – λI = - λ = - =
* det(A – λI) = 0

det = 0

**=(**)() – (2)(1) = 0

**=** 12 - - + – 2 = 0

**=**  - + 10 = 0

**=** ( = 0

= – 5 = 0

**1  = 5**

**=** – 2 = 0

**2 = 2**

* Jadi, nilai eigen **dari matriks A =** adalah  **1  = 5** dan **2 = 2**

1. **Tunjukan bahwa T, dimana T : R2 → R3**

**T =**

**Merupakan transformasi linear**

**Jawab :**

* Ambil sembarang , ϵ ℜ3 , α ϵ ℜ . Misalkan = , =
* T() = T =
* T() = T =
* Akan dibuktikan **T( + ) = T() + T()**

T( + ) = T =

=

=

= +

= T() + T()

**T( + ) = T() + T() (TERBUKTI)**

* Akan dibuktikan **T(α) = α T()**

T(α) = T =

=

=

= α T()

**T(α) = α T() (TERBUKTI)**

1. **Gambarkan grafik fungsi y = –x2 + 2x + 8**

**Jawab :**

Grafik fungsi y = –x2 + 2x + 8

* a = -1
* b = 2
* c = 8
* D = b2 – 4ac = 22 – 4(-1)(8) = 4 + 32 = 36
* a < 1 ( parabola terbuka ke bawah)
* D > 0 (memotong sumbu x di 2 titik)
* Titik potong di sumbu-x

–x2 + 2x + 8 = 0 | x (-1)

x2 - 2x - 8 = 0

(x - 4)(x + 2) = 0

**x = 4** dan **x = -2**

Titik potong di sumbu x adalah **(4, 0)** dan **(-2, 0)**

* Titik potong di sumbu y

(x = 0)

y = −𝑥2 + 2𝑥 + 8 = 0

y = −02 + 2(0) + 8 = 0

y = 8

Titik Potong di sumbu y adalah **(0, 8)**

* Titik Puncak (Xp – Yp)
* Xp = = = = 1
* Yp = = = = 9

Titik Potong **(1, 9)**

**Gambar grafik fungsi y = –x2 + 2x + 8**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  | y |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  | 10 |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  | 8 |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  | 6 |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  | 4 |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  | 2 |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | -X |  | -6 |  | -4 |  | -2 |  | 0 |  | 2 |  | 4 |  | 6 | X |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  | -y |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

1. **Tentukan f’(x) untuk f(x) = x2 – 4x**

**Jawab :**

* f(x) = x2 – 4x

f’(x) = (2)(1)x2-1 – (1)(4)x1-1

f’(x) = 2x1 – 4x0

**f’(x) = 2x -4**

1. **Terdapat data dalam bentuk tabel sebagai berikut :**

|  |  |
| --- | --- |
| **(x)** | **f(x)** |
| **1.3** | **3.669** |
| **1.5** | **4.482** |
| **1.7** | **5.474** |
| **1.9** | **6.686** |
| **2.1** | **8.166** |
| **2.3** | **9.974** |
| **2.5** | **12.182** |

1. **Hitunglah f(2.1) dengan rumus hampiran selisih pusat orde O(h2) dan O(h4)**
2. **Hitunglah f(1.6) dengan rumus hampiran selisih pusat orde O(h2)**

**Jawab :**

1. **f(2.1) dengan rumus hampiran selisih pusat orde O(h2) dan O(h4)**

* **Orde O(h2)**

Dik : h = 0,2

* f0’ =

f0 = (2.1)

Cari nilai f-1 dan f1

f-1 = (1.9) : 6.686

f1 = (2.3) : 9.974

f’(2.1) =

f’(2.1) = 8.22

* **Orde O(h4)**
* f0’ =

Karena ini merupakan Orde(h4) maka harus mencari 2 nilai sesudah dan sebelum f(2.1)

f-2 = (1.7) : 5.474

f-1 = (1.9) : 6.686

f1 = (2.3) : 9.974

f2 = (2.5) : 12.182

f’(2.1)=

f’(2.1) =

f’(2.1) =

f’(2.1) = 8.165

1. **(1.6) dengan rumus hampiran selisih pusat orde O(h2)**

* Karena menggunakan Orde(h2) maka mencari nilai 1 sebelum dan sesudah 1.6. Sehingga,

f0 = (1.6)

f-1 = (1.5) : 4.482

f1 = (1.7) : 5.474

* karena (1.6) memiliki perbedaan 0.1 dengan f-1 dan f1 maka nilai h adalah 0.1

f’(1.6) =

f’(1.6) =

f’(1.6) =

f’(1.6) = 4.96