1. A ball travels with velocity given by , with wind blowing in the direction given by w.r.t to some co-ordinate axes.

What is the size of the velocity of the ball in the direction of the wind?

A: 5/2

B:2/5

C:-2/5

D: -5/2

ANSWER: B

For f(x,y) = x^2y + frac{3}{4}xy + 10calculate the Jacobian row vector J.

A. J=[2xy+43​y,x2+43​x]

B. J=[xy+43​y+10,x2+43​xy+10]

C. J=[xy+43​y,x2+43​xy]

D. J=[2xy+43​y+10,x2+43​x+10]

Answer:C

Calculate the Jacobian of the function f(x, y, z) = x^2cos(y) + e^zsin(y) and evaluate at the point (x,y,z)=(π,π,1).

A. J(x,y,z)=(−2π,e,1)

B. J(x,y,z)=(−2π,e,0)

C. J(x,y,z)=(−2π,−e,0)

D.J(x,y,z)=(−2π,−e,1)

Answer:C

Given f(x,y,z) = x^2y + y^2z + z^2x, what are ∂x/∂f​,∂y/∂f​ and ∂z/∂f​?

1. ∂x/∂f​=2xy+y^2z+z^2x,∂y/∂f​= x^2 + 2yz + z^2x, ∂z/∂f​=x^2y + y^2 + 2zx
2. ∂x/∂f​=xy+z^2, ∂y/∂f​=x^2 + yz, ∂z/∂f​=y^2 + zx
3. ∂x/∂f​=3xyz,∂y/∂f​=3xyz,∂z/∂f​=3xyz
4. ∂x/∂f​=2xy+z, ∂y/∂f​=x^2 + 2yz, ∂x/∂f​= y^2 + 2zx

Answer:D

Given the matrix T= = Calculate T3.

A:

B:

C:

D:

ANSWER: B

What is the derivative of the function f(x) = x^2cos(x^3)f(x)=x^2cos(x3)?

A. f'(x) = 2xsin(x^3) -3x^4sin(x^3)f′(x)=2xsin(x^3)−3x4sin(x^3)

B. f'(x) = 2xcos(x^3) -3x^4cos(x^3)f′(x)=2xcos(x^3)−3x4cos(x^3)

C. f'(x) = 2xsin(x^3) -3x^4cos(x^3)f′(x)=2xsin(x^3)−3x^4cos(x^3)

D. f'(x) = 2xcos(x^3) -3x^4sin(x^3)f′(x)=2xcos(x^3)−3x^4sin(x^3)

Answer-D

For f(x,y,z) = xe^ycos(z) + 5x^2sin(y)e^z calculate the the Jacobian row vector and evaluate at the point (0, 0, 0)(0,0,0).

A.J(0,0,0)=[−1,0,1]

B.J(0,0,0)=[1,0,−1]

C.J(0,0,0)=[0,0,1]

D.J(0,0,0)=[1,0,0]

Answer:D

Given the matrix T= and change of basis matrix C= (whose columns are eigenvectors of T), calculate the diagonal matrix T= CDC-1

A:

B:

C:

D:

ANSWER:A

For which condition there is no α-approximation algorithm for the general versiton of TSP for any constant α.

P=NP

P=αP

P!=αP

P!=NP

Answer: D

Given the matrix T= = Calculate T3.

A:

B:

C:

D:

ANSWER: C

Which of the following algorithms can Trade-off between quality and running time of a single iteration?

Brute force

Nearest Neighbours

Dynamic Programming

Local Search

Answer D

Which of the following is not a proof of 2-approximation algorithm?

The total length of MST T is atmost opt.

Bypasses can only decrease the total length.

The algorithm that achieves a factor of 1.5

None of the Choices.

Answer C

What are the main two heuristics of Branch and Bound?

Branch:order of yet visited nodes(say, select closer neighbors last)

Branch:order of yet unvisited nodes(say, select closer neighbours first)

Branch:order of yet unvisited nodes(say, select farther first)

Branch:order of yet visited nodes(say, select farther last)

Answer B