Set 1:

Question 1:

To find the derivative of f(x)= √*x*​ using limits, we use the definition of the derivative:

f′(x)=limh→0 f(x+h)−f(x)/*h*

For f(x)= √x

f′(x)=limh→0 √x+h−√x/h

Multiplying :

f′(x)=lim h→0 (√x+h−√x)( √x+h+√x)/h(√x+h+√x)

f′(x)=lim h→0(x+h)−x/h(√x+h+√x)

f′(x)=lim⁡h→0 h/h(√x+h+√x)

f′(x)=lim⁡h→0 1/√x+h+√x

As h→0

f′(x)=1/2√x

So, the derivative of f(x)= √*x*​ is:

f′(x)=1/2√x

Question 2:

(i) For f(x)=x5+4x3−2/x2

=f(x)=x3+4x−2/x2

=∫f(x) dx=∫(x3+4x−2/x2) dx

=∫f(x) dx=x4/4+2x2+2/x+C

(ii) For f(x)=(x+1/x)2

f(x)=x2+2+1/x2

∫f(x) dx=∫(x2+2+1/x2) dx

∫f(x) dx=x3/3+2x−1/x+C

Question 3:

**Given Function**

f(x,y)=2x2−xy+xy2

**Partial Derivative with Respect to x*x***

∂f/∂x=∂/∂x(2x2−xy+xy2)

Let's differentiate each term separately:

1. ∂/∂x(2x2)=4x
2. ∂/∂x(−xy)=−y
3. ∂/∂x(xy2)=y2

Combining these results:

∂f/∂x=4x−y+y2

**=>**

∂f/∂y=∂/∂y(2x2−xy+xy2)

Let's differentiate each term separately:

1. ∂/∂y(2x2)= 0 (since 2*x*2 is independent of y)
2. ∂/∂y(−xy)=−x
3. ∂/∂y(xy2)=2xy

Combining these results:

∂f/∂y=−x+2xy

Set 2:

Question 4:

**Given Vectors**

A⃗=i^−j^+k^

B⃗=2i^+2j^+3k^

C⃗=2i^+2j^

**Vector Components**

A⃗=(1 −1 1)

B⃗=(2 2 3)

C⃗=( 2 2 0)

**Calculate A⃗+2B⃗**

A⃗+2B⃗=(1 −1 1)+2(2 2 3)

A⃗+2B⃗=(1 −1 1)+(4 4 6)

A⃗+2B⃗=(5 3 7)

**Calculate A⃗+2B⃗−C⃗*A*+2*B*−*C***

A⃗+2B⃗−C⃗=(5 3 7)−(2 2 0)

A⃗+2B⃗−C⃗=(3 1 7)

Question 5:

To convert radians to degrees, we use the conversion factor:

1 Radian=180/π degrees

Using this conversion factor:

1 Radian=180/π degrees≈57.2958 degrees

Question 6:

1. **√3+i**

**Modulus**

∣z∣=√a2+b2

For z=3+i

∣z∣=√ (3)2+(1)2=√3+1=4=2

**Amplitude**:

θ=tan−1(b/a)

For z=√3+i:

θ=tan−1(1/√3)=π/6≈0.524 radians

**(ii) −1+i√3**

1. **Modulus**: For z=−1+i √ 3

∣z∣= √ (−1)2+( √ 3)2= √ 1+3= √ 4=2

1. **Amplitude**: For z=−1+i √ 3

θ=tan −1(√ 3/−1)

=>

θ=π+tan⁡−1(√ 3/−1)=π−π/3=2π/3 ≈ 2.094 radians