Lecture Notes
Calc 2

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Contents

Chapter 1

Examples

1.1 Random Examples

Definition 1.1.1: The formal definition of a geometric series sum

$$\sum_{i=0}^{\infty} U_i \cdot r$$

Question 1

$$(x^2 + 3x) = x(x + 3)$$

Note:-

This was made by llama3:8b locally and its wrong. RIP AI 2024

Solution: To compute the indefinite integral of $\ln(2x)$, we'll use integration by parts. Here are the steps:

Step 1: Write down the integral

$$\int \ln(2x)dx$$

Step 2: Identify the integrand The integrand is $\ln(2x)$. We can rewrite it as a product of two functions:

$$\ln(2x) = u(x)v'(x)$$

where $u(x) = \ln(2x)$ and $v'(x) = 1$.

Step 3: Choose the antiderivative We'll choose $u(x)$ to be the antiderivative of $\ln(2x)$. This means we'll integrate it with respect to x:

$$\int \ln(2x)dx = u(x)v(x) + C$$

where C is the constant of integration.

Step 4: Integrate $\ln(2x)$ Now, let's integrate $\ln(2x)$:

$$\int \ln(2x)dx = \frac{\ln^2(2x)}{2} + C$$

We can do this by using the power rule of integration and the fact that the derivative of $\ln(x)$ is $1/x$.

Step 5: Apply the product rule (integration by parts) To integrate $u(x)v'(x) = \ln(2x)dx$, we'll apply the product rule:

$$\int \ln(2x)dx = u(x)v(x) - \int v(x)du(x)$$

Substituting our values for $u(x)$ and $v(x)$, we get:

$$\frac{\ln^2(2x)}{2} + C = [\ln(2x)]\, x - \int (1/x)(\ln(2x))dx$$

Step 6: Simplify the integral Now, let's simplify the integral on the right-hand side:

$$-\int (1/x)(\ln(2x))dx = -(\ln(2x))/x + C_1$$

where C_1 is another constant of integration.

Step 7: Combine the two parts Finally, we combine the two parts to get our final answer:

$$\frac{\ln^2(2x)}{2} - \frac{\ln(2x)}{x} + C$$

Claim 1.1.1 Claiming

I don't know math

Example 1.1.1 (Open Set and Close Set)

Open Set:
- ϕ
- $\bigcup_{x \in X} B_r(x)$ (Any $r > 0$ will do)
- $B_r(x)$ is open

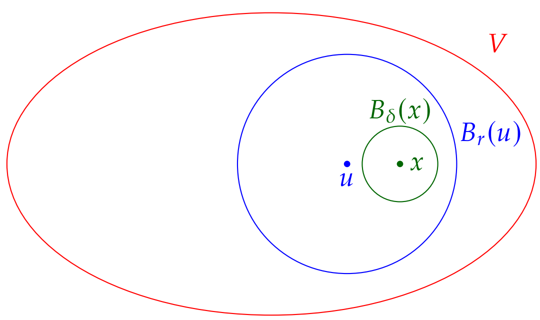
Closed Set:
- $X,\ \phi$
- $\overline{B_r(x)}$

$x-$axis $\cup$ $y-$axis

Theorem 1.1.1

If $x \in$ open set V then $\exists\ \delta > 0$ such that $B_\delta(x) \subset V$

Proof: By openness of V, $x \in B_r(u) \subset V$



Given $x \in B_r(u) \subset V$, we want $\delta > 0$ such that $x \in B_\delta(x) \subset B_r(u) \subset V$. Let $d = d(u, x)$. Choose δ such that $d + \delta < r$ (e.g. $\delta < \frac{r-d}{2}$)

If $y \in B_\delta(x)$ we will be done by showing that $d(u, y) < r$ but

$$d(u, y) \leqslant d(u, x) + d(x, y) < d + \delta < r$$

😊

Corollary 1.1.1

By the result of the proof, we can then show...

Lenma 1.1.1

Suppose $\vec{v}_1, \ldots, \vec{v}_n \in \mathbb{R}^n$ is subspace of $\mathbb{R}^n$.

Proposition 1.1.1

$1 + 1 = 2$.

Chapter 2

Algorithms

2.1 Pseudocode

Algorithm 1: what

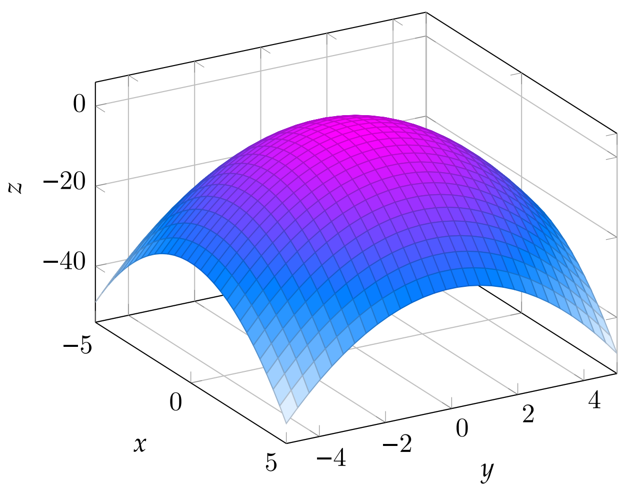
```
Input: This is some input
Output: This is some output
/* This is a comment */

some code here;
x ← 0;
y ← 0;
if x > 5 then
|  x is greater than 5 ;                    // This is also a comment
else
|  x is less than or equal to 5;
end
foreach y in 0..5 do
|  y ← y + 1;
end
for y in 0..5 do
|  y ← y − 1;
end
while x > 5 do
|  t
end
vi  x ← x − 1;
return Return something here;
```

Chapter 3

Plots

3.1 3d

Example 3.1.1 (A 3D plot of $z = 1 - x^2 - y^2$.)



Chapter 4

Diagrams

4.1 Circular