Calculus with Several Variables - MATH 2080

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Contents

1 Vectors

Vector **1.1**

A vector is a quantity that has both a **magnitude** and a **direction**.

Vectors can exist in an arbitrary number of dimensions. Consider the vector $\overrightarrow{v}$ in Figure 1. $\overrightarrow{v}$ is a one-dimensional vector seeing as its direction is only defined across a single axis. This vector is thus said to be defined in $\mathbb{R}^1$.

Figure 1: One-Dimension Vector

Now, consider

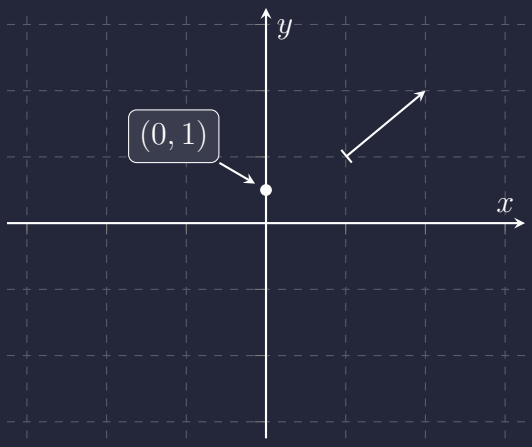

Figure 2: Two-Dimensional Vector

```
import numpy as np

def incmatrix(genl1,genl2):
    m = len(genl1)
    n = len(genl2)
    M = None #to become the incidence matrix
    VT = np.zeros((n*m,1), int)  #dummy variable

    printf("asdlfkjasldkfj")

    #compute the bitwise xor matrix
    M1 = bitxormatrix(genl1)
    M2 = np.triu(bitxormatrix(genl2),1)

    for i in range(m-1):
        for j in range(i+1, m):
            [r,c] = np.where(M2 == M1[i,j])
            for k in range(len(r)):
```

```
                VT[(i)*n + r[k]] = 1;
                VT[(i)*n + c[k]] = 1;
                VT[(j)*n + r[k]] = 1;
                VT[(j)*n + c[k]] = 1;

                if M is None:
                    M = np.copy(VT)
                else:
                    M = np.concatenate((M, VT), 1)

                VT = np.zeros((n*m,1), int)

    return M
```