Dator och nÃďtverksteknik

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Contents

1 Example Textbook

1.1 First Chapter Example

For proofs, we're going to use a more general field $\mathbb{F}$ to prove our theorems, so that our our proofs also apply to the fields $\mathbb{R}$ and $\mathbb{C}$.

Definition 1. *$\mathbb{F}^n$ is the set of all lists of length n of elements of $\mathbb{F}$.*

$$\mathbb{F}^n = \{(x_1, \ldots, x_n) \mid x_j \in \mathbb{F} \,\forall j = 1, \ldots, n\}$$

*For $(x_1, \ldots, x_n) \in \mathbb{F}$ and $j \in \{1, \ldots, n\}$, we say that x_j is the j^{th} **coordinate** of $(x_1, \ldots, x_n)$. $(x_1, \ldots, x_n)$ are scalars, a.k.a. numbers.*

This means that if we say $\mathbb{F} = \mathbb{R}$ then we can apply the theorems in the real n-space.

2 Lectures

2.1 Lecture 1: Area of the Sphere

To calculate the area of the sphere, we begin with:

$$x^2 + y^2 = r^2 \tag{1}$$
$$y = \sqrt{r^2 - x^2} \tag{2}$$

Then use an integral to describe the length of the half circle:

$$\int_{-r}^{r} \sqrt{1 - (\frac{dy}{dx})^2} dx \tag{3}$$

Now apply a revolution to that:

$$\pi \int_{-r}^{r} \left(1 - \left(\frac{dy}{dx}\right)^2\right) dx \tag{4}$$

Since $\dfrac{dy}{dx} = \dfrac{1}{2}\left(r^2 - x^2\right)^{-\frac{1}{2}} * (-2x) = -\dfrac{x}{\sqrt{r^2 - x^2}}$ Then

$$\pi \int_{-r}^{r} \left(1 - \left(-\frac{x}{\sqrt{r^2 - x^2}}\right)^2\right) dx \tag{5}$$
$$\tag{6}$$

Which then is:

$$\pi \int_{-r}^{r} \left(1 - \left(\frac{x^2}{r^2 - x^2}\right)\right) dx = \tag{7}$$

$$\pi \int_{-r}^{r} \left(1 - \left(\frac{x^2}{r^2 - x^2}\right)\right) dx = \tag{8}$$

$$\pi \int_{-r}^{r} \left(1 - \left(\frac{x^2}{r^2 - x^2}\right)\right) dx = \tag{9}$$

2.2 Lecture 2: Title of This Other Lecture

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