# A Subject

Otto Martinwall

February 22, 2022

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

c velit et gravida. Nunc sapien orci, malesuada sed porta at, pretium quis urna. Praesent egestas neque justo, sed feugiat arcu sollicitudin finibus. Integer facilisis placerat aliquet. Pellentesque ut porttitor risus. Duis eu congue lectus, eu facilisis arcu. Ut maximus lobortis nisi, consequat dictum eros convallis sollicitudin. Sed ac risus maximus, congue neque ac, ornare sapien. Fusce interdum convallis auctor. Nam sit amet luctus lectus, ut tristique nisl. Suspendisse imperdiet dolor at libero molestie volutpat.

Suspendisse posuere ante eget tortor molestie tristique. Sed condimentum, enim eget maximus euismod, mi lorem venenatis ligula, non molestie ex nulla ac enim. Aliquam convallis maximus sapien, a ullamcorper massa auctor eu. Curabitur vel lectus id lacus tincidunt pellentesque et a nibh. Donec dapibus, nulla ut fermentum laoreet, dolor lacus dapibus urna, at tempor nulla magna a tortor. Ut id pharetra felis. Nam lobortis justo non nibh auctor, ac porta nibh commodo. Duis dictum sem vel ante lacinia mollis.