Linear Algebra

Otto Martinwall

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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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