

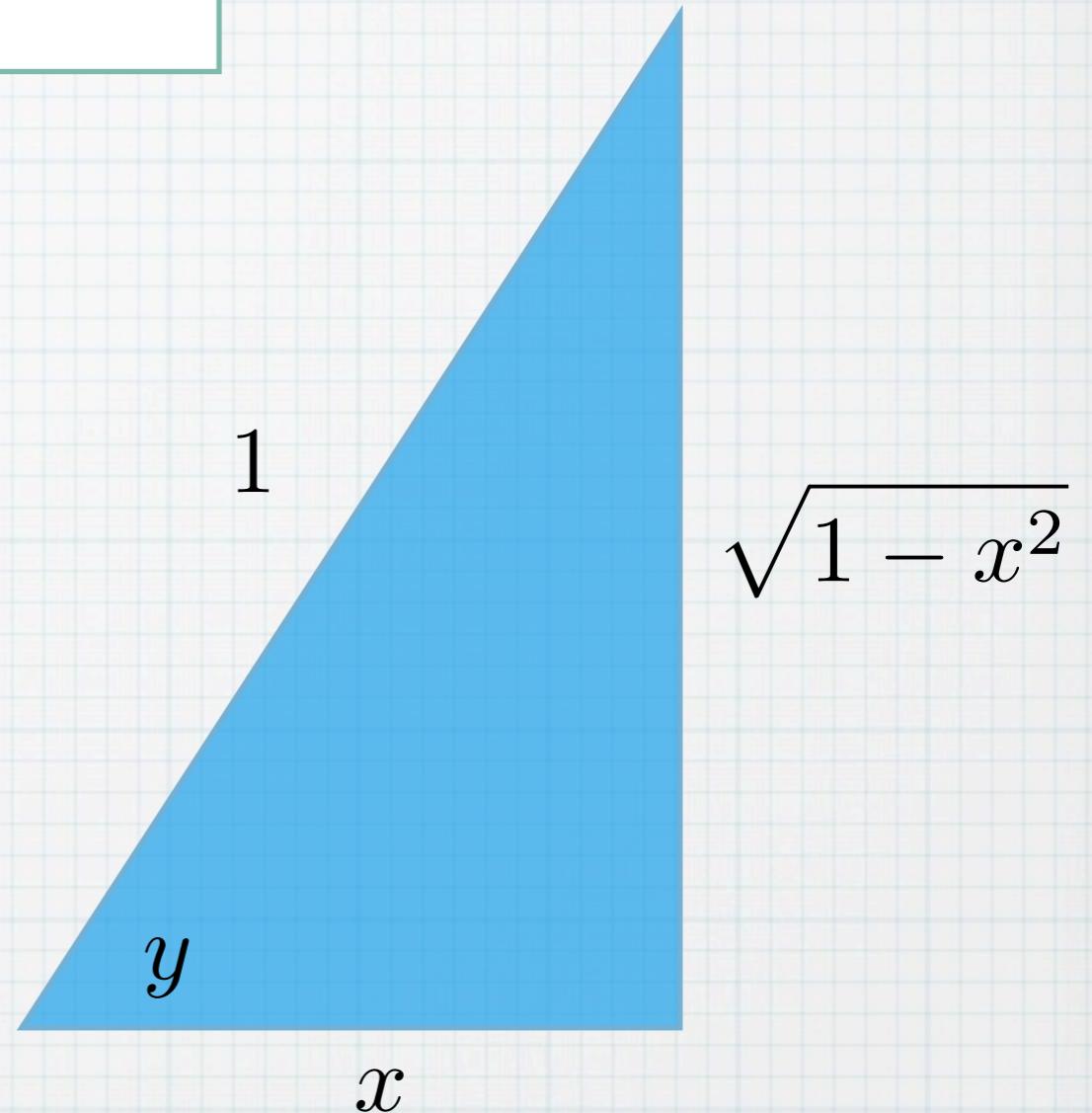
# Derive and Integrate ArcCosine

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Chris Thiel, OFMCap

$$\frac{d}{dx}(y) = \frac{d}{dx}(\arccos x)$$

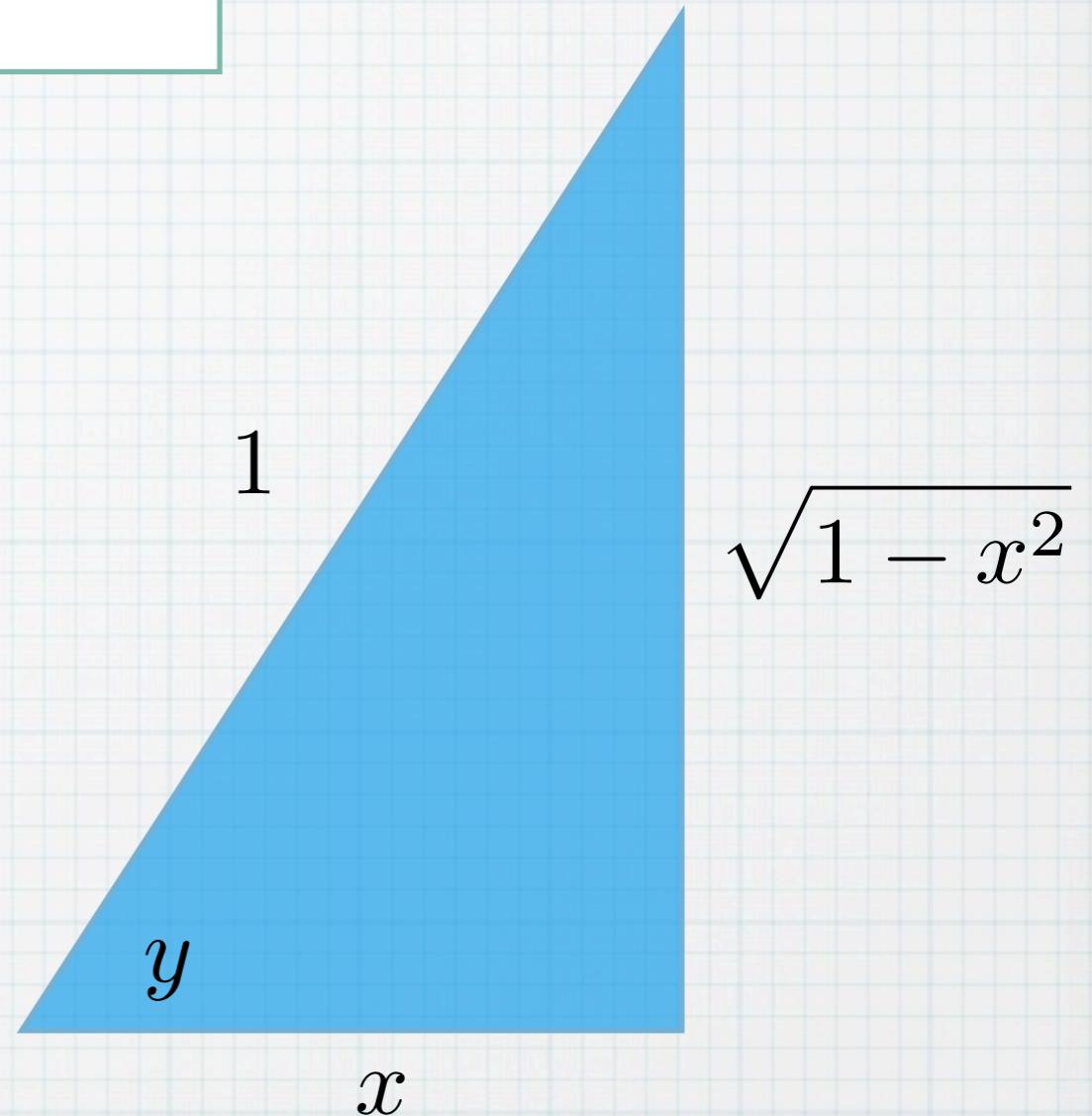
$$y = \arccos x$$



$$\frac{d}{dx}(y) = \frac{d}{dx}(\arccos x)$$

$$y = \arccos x$$

$$\cos(y) = x$$

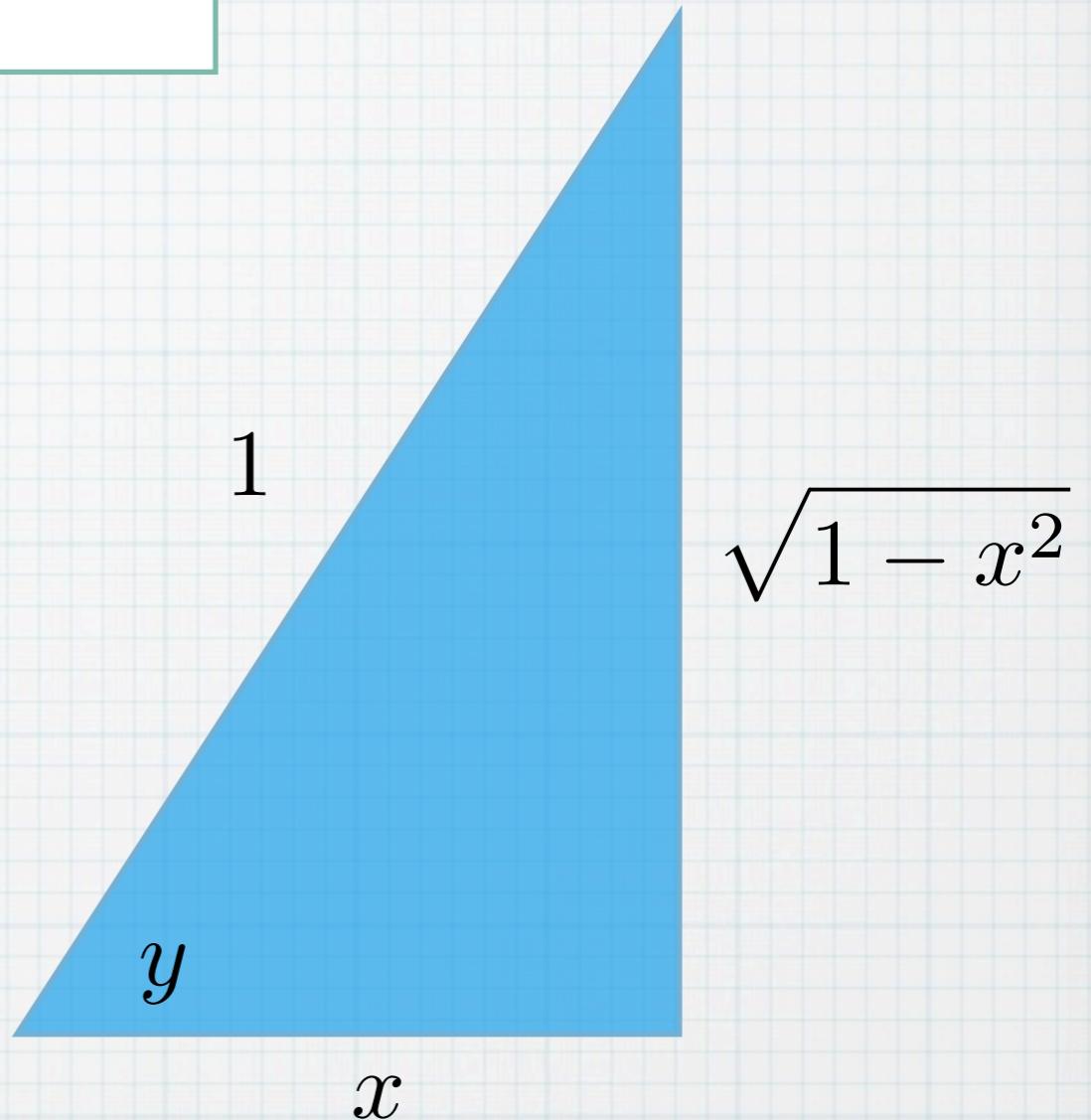


$$\frac{d}{dx}(y) = \frac{d}{dx}(\arccos x)$$

$$y = \arccos x$$

$$\cos(y) = x$$

$$\frac{d}{dx}(\cos y) = \frac{d}{dx}(x)$$



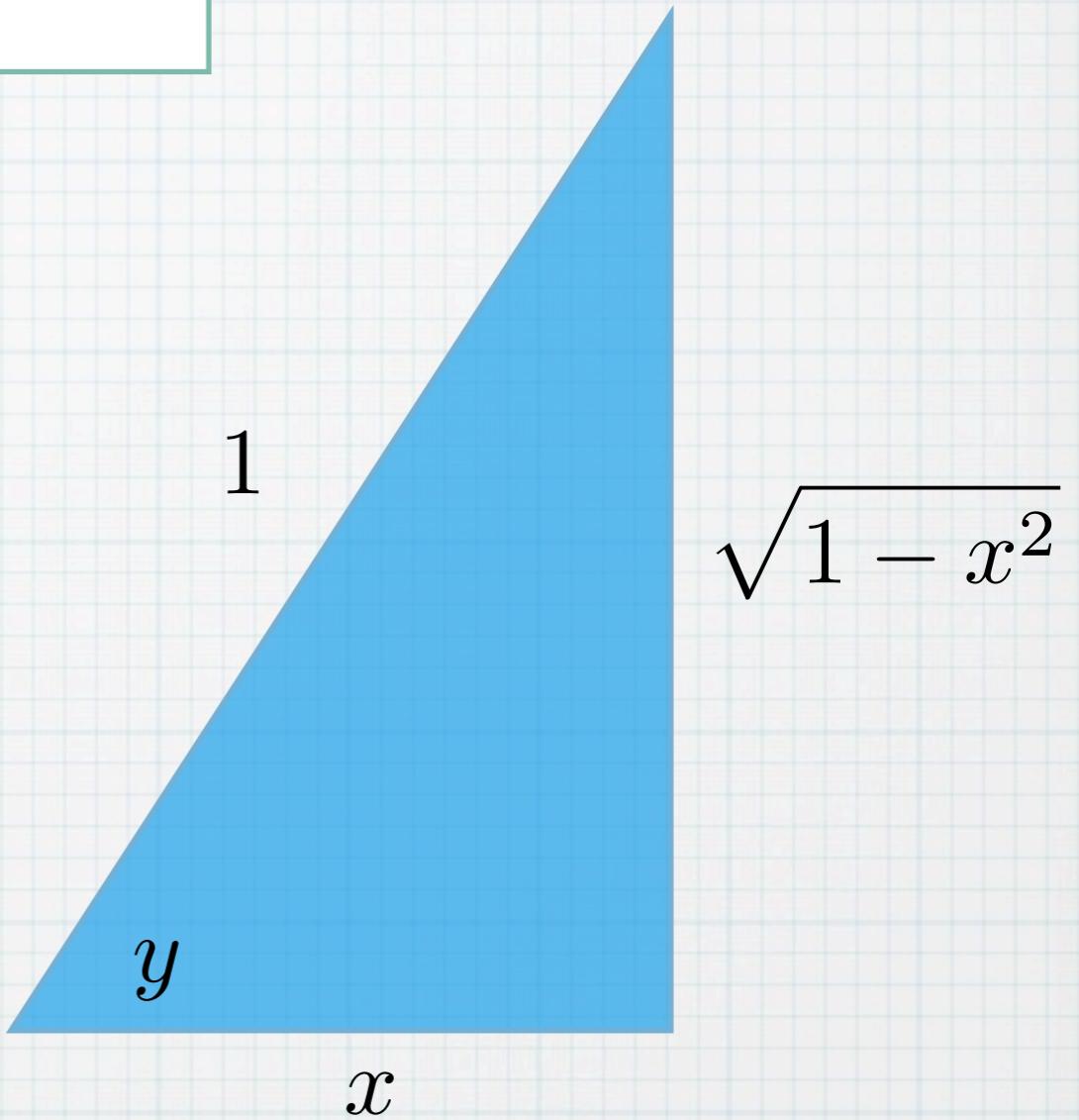
$$\frac{d}{dx}(y) = \frac{d}{dx}(\arccos x)$$

$$y = \arccos x$$

$$\cos(y) = x$$

$$\frac{d}{dx}(\cos y) = \frac{d}{dx}(x)$$

$$-\sin(y) \frac{dy}{dx} = 1$$



$$\frac{d}{dx}(y) = \frac{d}{dx}(\arccos x)$$

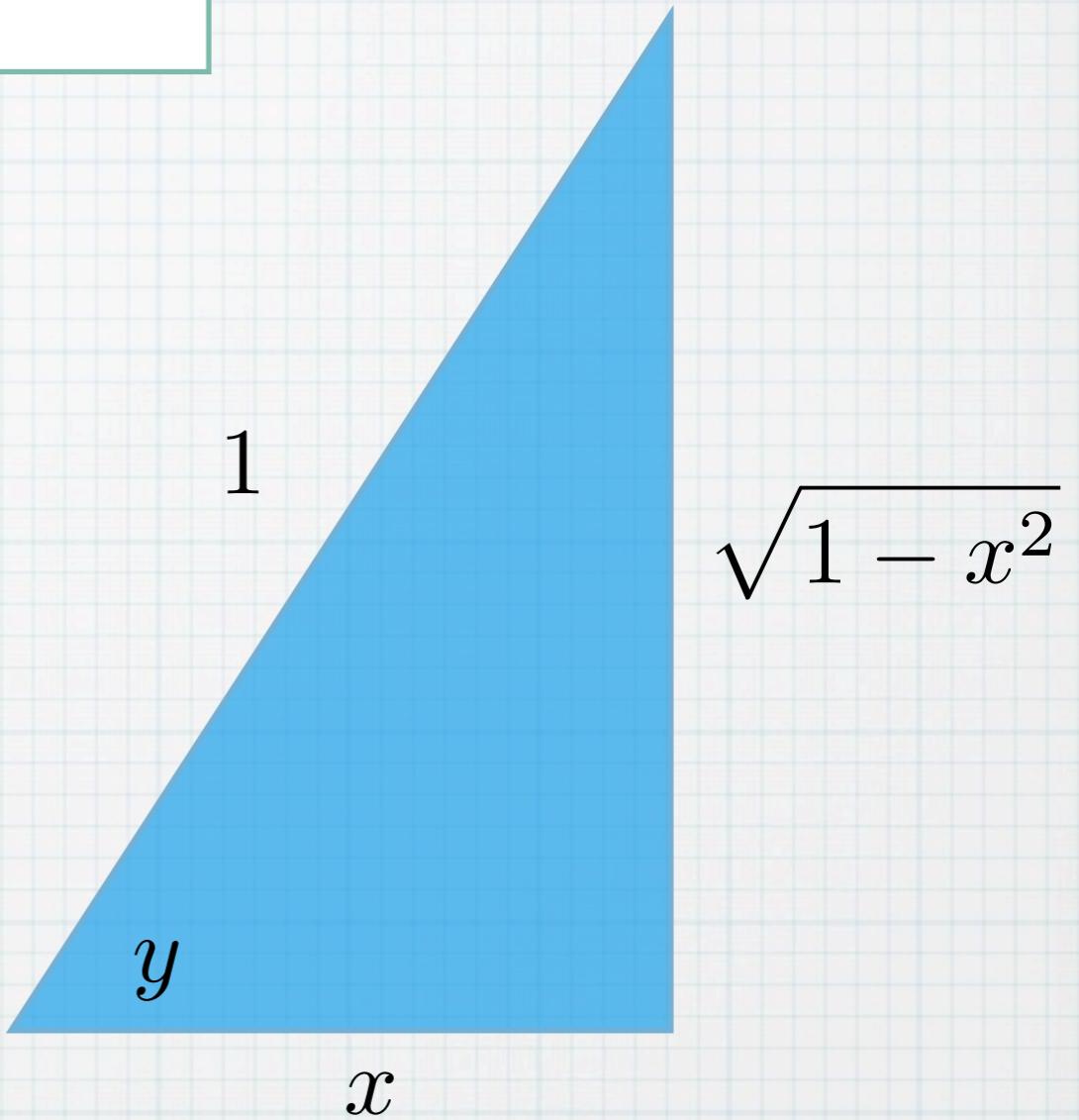
$$y = \arccos x$$

$$\cos(y) = x$$

$$\frac{d}{dx}(\cos y) = \frac{d}{dx}(x)$$

$$-\sin(y) \frac{dy}{dx} = 1$$

$$\frac{dy}{dx} = \frac{-1}{\sin(y)}$$



$$\frac{d}{dx}(y) = \frac{d}{dx}(\arccos x)$$

$$y = \arccos x$$

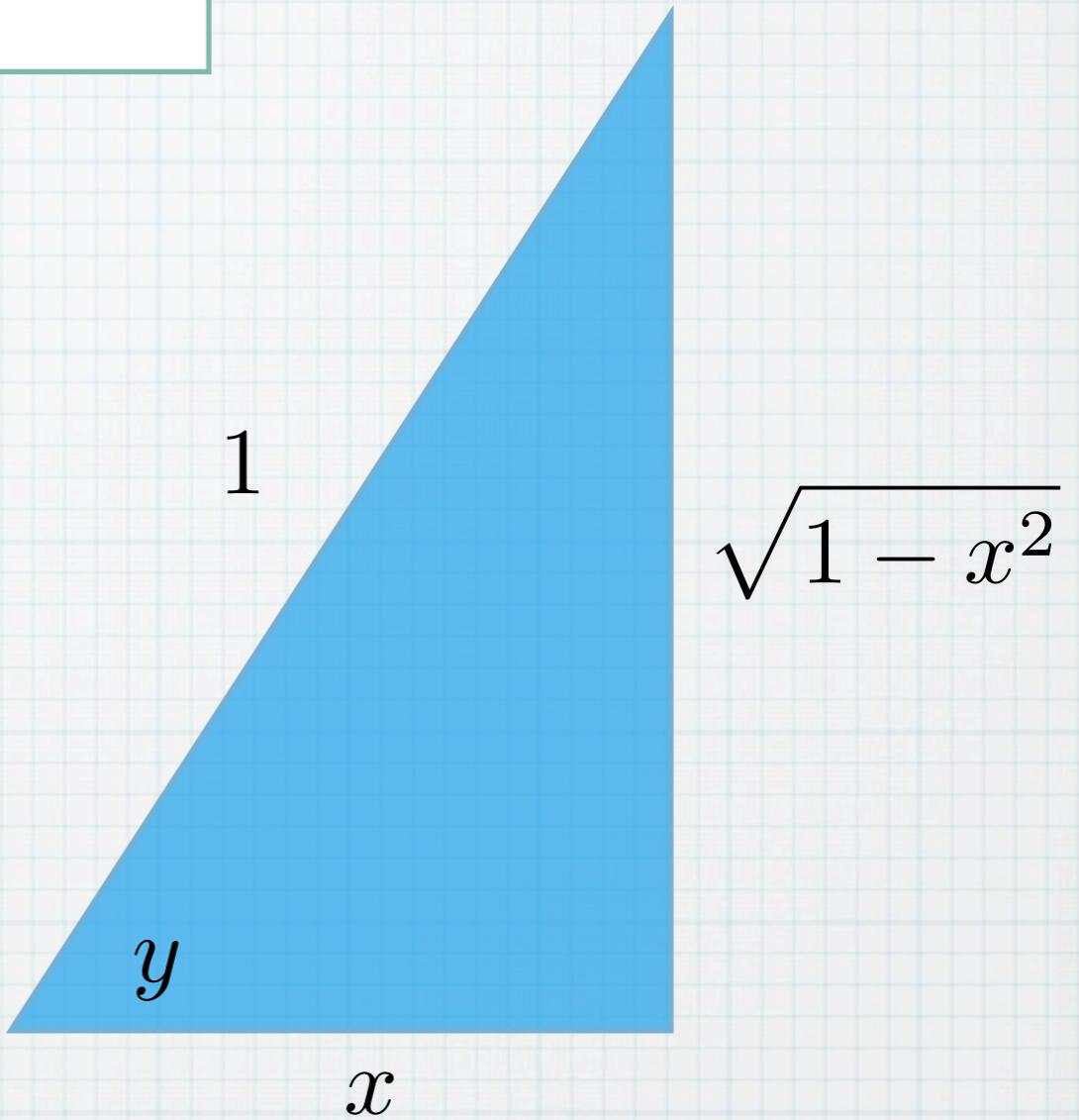
$$\cos(y) = x$$

$$\frac{d}{dx}(\cos y) = \frac{d}{dx}(x)$$

$$-\sin(y) \frac{dy}{dx} = 1$$

$$\frac{dy}{dx} = \frac{-1}{\sin(y)}$$

$$\frac{dy}{dx} = \frac{-1}{\sqrt{1-x^2}}$$



$$\int \arccos x \ dx$$

$$\int \arccos x \ dx$$

$$\int u \ dv = uv - \int v \ du$$

$$u = \arccos x$$

$$v = x$$

$$du = \frac{-1}{\sqrt{1-x^2}} \ dx \quad dv = dx$$

$$\int \arccos x \ dx$$

$$\int u \ dv = uv - \int v \ du$$

$$u = \arccos x \qquad \qquad v = x$$

$$du = \frac{-1}{\sqrt{1-x^2}} \ dx \quad dv = dx$$

$$x \arccos x - \int \frac{-x}{\sqrt{1-x^2}} \ dx$$

$$\int \arccos x \ dx$$

$$\int u \ dv = uv - \int v \ du$$

$$u = \arccos x \qquad \qquad v = x$$

$$du = \frac{-1}{\sqrt{1-x^2}} \ dx \quad dv = dx$$

$$x \arccos x - \int \frac{-x}{\sqrt{1-x^2}} \ dx$$

$$x \arccos x + \int \frac{x}{\sqrt{1-x^2}} \ dx$$

$$\int \arccos x \ dx$$

$$\int u \ dv = uv - \int v \ du$$

$$u = \arccos x \qquad \qquad v = x$$

$$du = \frac{-1}{\sqrt{1-x^2}} \ dx \quad dv = dx$$

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$$x \arccos x + \int \frac{x}{\sqrt{1-x^2}} \ dx$$

$$u_2 = 1 - x^2$$

$$\int \arccos x \ dx$$

$$\int u \ dv = uv - \int v \ du$$

$$u = \arccos x$$

$$v = x$$

$$du = \frac{-1}{\sqrt{1-x^2}} \ dx \quad dv = dx$$

$$x \arccos x - \int \frac{-x}{\sqrt{1-x^2}} \ dx$$

$$x \arccos x + \int \frac{x}{\sqrt{1-x^2}} \ dx$$

$$u_2 = 1 - x^2$$

$$du_2 = -2x \ dx$$

$$\int \arccos x \ dx$$

$$\int u \ dv = uv - \int v \ du$$

$$u = \arccos x$$

$$v = x$$

$$du = \frac{-1}{\sqrt{1-x^2}} dx \quad dv = dx$$

$$x \arccos x - \int \frac{-x}{\sqrt{1-x^2}} dx$$

$$x \arccos x + \int \frac{x}{\sqrt{1-x^2}} dx$$

$$u_2 = 1 - x^2$$

$$du_2 = -2x \ dx$$

$$-\frac{1}{2} du_2 = x \ dx$$

$$\int \arccos x \ dx$$

$$\int u \ dv = uv - \int v \ du$$

$$u = \arccos x$$

$$v = x$$

$$du = \frac{-1}{\sqrt{1-x^2}} dx \quad dv = dx$$

$$x \arccos x - \int \frac{-x}{\sqrt{1-x^2}} dx$$

$$x \arccos x + \int \frac{x}{\sqrt{1-x^2}} dx$$

$$u_2 = 1 - x^2$$

$$du_2 = -2x \ dx$$

$$-\frac{1}{2} du_2 = x \ dx$$

$$-\frac{1}{2} \int u^{-1/2} dx$$

$$-u^{1/2}$$

$$-\sqrt{1-x^2}$$

$$\int \arccos x \ dx$$

$$\int u \ dv = uv - \int v \ du$$

$$u = \arccos x$$

$$v = x$$

$$du = \frac{-1}{\sqrt{1-x^2}} dx \quad dv = dx$$

$$x \arccos x - \int \frac{-x}{\sqrt{1-x^2}} dx$$

$$x \arccos x + \int \frac{x}{\sqrt{1-x^2}} dx$$

$$u_2 = 1 - x^2$$

$$du_2 = -2x \ dx$$

$$-\frac{1}{2} du_2 = x \ dx$$

$$-\frac{1}{2} \int u^{-1/2} dx$$

$$-u^{1/2}$$

$$-\sqrt{1-x^2}$$

$$x \arccos x = \sqrt{1-x^2}$$