Write down the proof that $\sqrt{2}$ is irrational

Write down the proof by first principles that $y=\sin(x)$ differentiates to $\cos(x)$

Write down the proof that $\sqrt{2}$ is irrational

Assume $\sqrt{2} $is rational, i.e. $\sqrt{2}=\frac{a}{b}$ where $\frac{a}{b}$ is a fraction in lowest terms.

$$\sqrt{2}=\frac{a}{b}$$

$$⟹2=\frac{a^{2}}{b^{2}}$$

$$⟹2b^{2}=a^{2}$$

$⟹a^{2}$ must be even

$⟹a$ is even

$$⟹a=2p$$

$$⟹a^{2}=\left(2p\right)^{2}=4p^{2}$$

$$⟹2b^{2}=4p^{2}$$

$$⟹b^{2}=2p^{2}$$

$⟹$ $a$ and $b $are both even

$⟹$ contradiction.

$⟹$ our original assumption must be wrong…

$\sqrt{2} $is irrational.

Write down the proof by first principles that $y=\sin(x)$ differentiates to $\cos(x)$

