

$$f(x) = \cos(x) + \sin(x)$$

Show that f has a zero in the interval $(0, \pi)$

Proof: f has a zero in the interval $(0, \pi)$ is true.

$g(x) = \cos(x)$, continuous everywhere by definition of trig function

$h(x) = \sin(x)$, continuous everywhere by definition of trig function

$$g(x) + h(x)$$

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$\cos(x) + \sin(x)$, continuous everywhere by addition operation.

$f(x) = \cos(x) + \sin(x)$, $f(x)$ is continuous everywhere

$f(x)$ is continuous on $[0, \pi]$ interval

$$\begin{aligned} f(0) &= \cos(0) + \sin(0) \\ &= 1 + 0 \\ &= 1 \end{aligned}$$

$$\begin{aligned} f(\pi) &= \cos(\pi) + \sin(\pi) \\ &= -1 + 0 \\ &= -1 \end{aligned}$$

for $f(0)$ and $f(\pi)$ interval is $(-1, 1)$

N is located between interval $(-1, 1)$

c is located between interval $(0, \pi)$

$(-1, 1)$ are the exact values of $(0, \pi)$ on unit circle

$$f(c) = N$$

$N = 0$ between the interval $(-1, 1)$

$\therefore f$ has a zero in the interval $(0, \pi)$ is true.