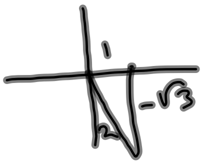
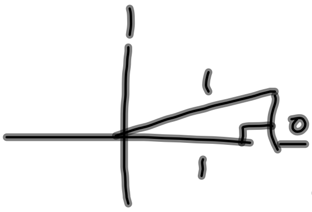
$2\cos^2 x + \cos x - 1$

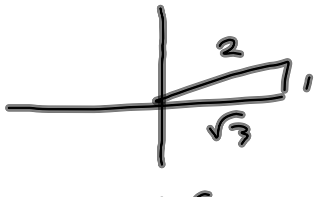
$(2\cos x - 1)(\cos x + 1) = 0$

$\cos x = \frac{1}{2} = \frac{adj}{hyp}$ $\quad \cos x = -1$

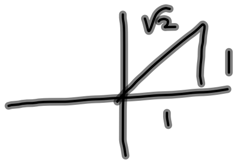




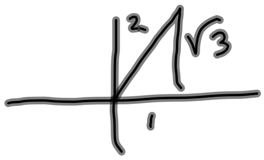
$\theta = 0$



$\theta = \frac{\pi}{6} = 30^\circ$

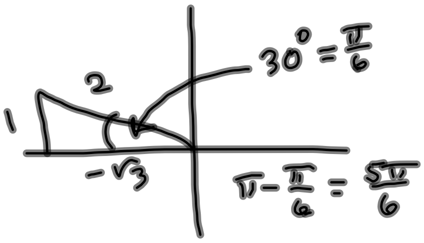


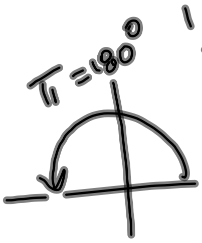
$\theta = \frac{\pi}{4} = 45^\circ$



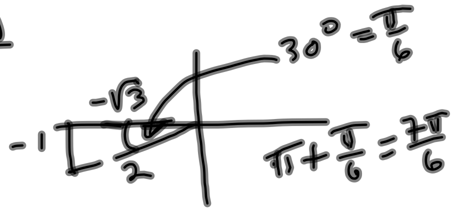
$\theta = \frac{\pi}{3} = 60^\circ$

$\cos\theta = -\frac{\sqrt{3}}{2}$



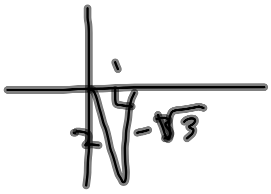


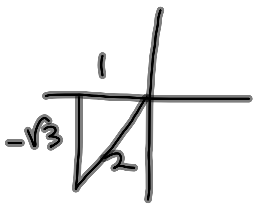
$\theta = \frac{\pi}{2} = 90^\circ$



$\sin\theta = -\frac{\sqrt{3}}{2}$

1, 1, $\sqrt{2}$
1, 2, $\sqrt{3}$

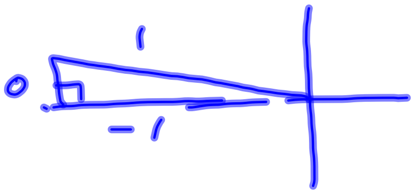




$\cos^2 x - \sin^2 x = 0$

$\cos^2 x - (1 - \cos^2 x) = 0$

$2\cos^2 x - 1 = 0$



$\pm$

$* \ |\cos x| = \sqrt{\cos^2 x} = \sqrt{\frac{1}{2}}$

$*$

$\cos x = \pm\sqrt{\frac{1}{2}} = \pm \frac{\sqrt{1}}{\sqrt{2}} = \pm \frac{1}{\sqrt{2}}$

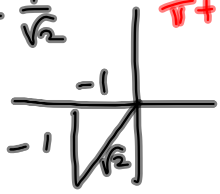
$\cos x = \frac{1}{\sqrt{2}}$

$\frac{\pi}{4}$

$2\pi - \frac{\pi}{4} = \frac{7\pi}{4}$

$\cos x = -\frac{1}{\sqrt{2}}$

$\pi + \frac{\pi}{4} = \frac{5\pi}{4}$



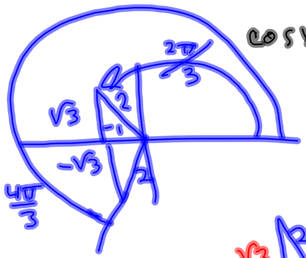
$\pi - \frac{\pi}{4} = \frac{3\pi}{4}$

Test 1 questions

#8 Find all $x \ni 2\cos x + 1$ is horizontal

$$2\cos x = -1$$

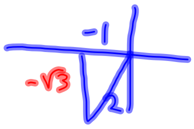
$$\cos x = -\tfrac{1}{2}$$



$x = \frac{2\pi}{3}, \frac{4\pi}{3}$

$x \in \{\frac{2\pi}{3}, \frac{4\pi}{3}\}$

Beautiful job on wrong prob.

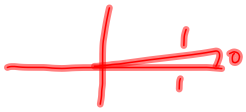


$$f'(x) = -2\sin x = 0$$

$$\sin x = 0$$

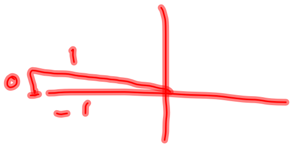
on $\mathbb{R}$:

$x \in \{n\pi \mid n \in \mathbb{Z}\}$



$x = 0$

$0, \pm\pi, \pm 2\pi, \pm 3\pi, \ldots$



$x = \pi$

$x = n\pi, \ n \in \mathbb{Z}$

$x = n\pi, \ n = 0, \pm 1, \pm 2, \ldots$

$$\mathbb{N} = \{1, 2, 3, \ldots\}$$

$$\mathbb{Z} = \{\ldots, -3, -2, -1, 0, 1, 2, 3, \ldots\}$$

$$\mathbb{Q} = \left\{ \frac{p}{q} \mid p, q \in \mathbb{Z}, \ q \neq 0 \right\}$$

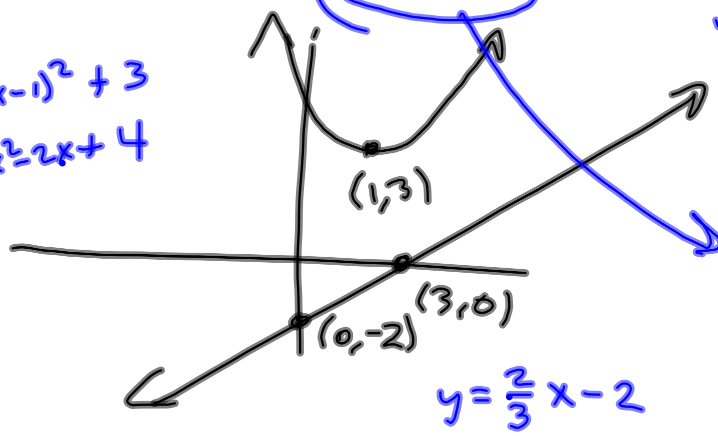
$\mathbb{R}^{+} = [0, \infty)$

$\mathbb{R}^{++} = (0, \infty)$

$\mathbb{R} = (-\infty, \infty)$

Find $x \ni$ Distance from $y = x^2 - 2x + 4$ to $y = \frac{2}{3}x - 2$

$(x-1)^2 + 3$
$= x^2 - 2x + 4$



$y = \frac{2}{3}x - 2$

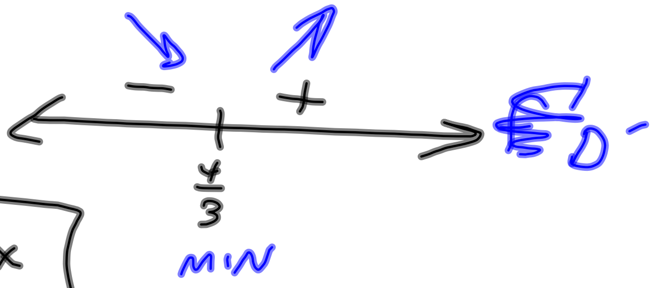
Vertical Distance

$$D = \left| x^2 - 2x + 4 - \left(\tfrac{2}{3}x - 2\right) \right|$$
$$= x^2 - 2x + 4 - \tfrac{2}{3}x + 2$$
$$= x^2 - \tfrac{8}{3}x + 6$$

$$\frac{dD}{dx} = 2x - \frac{8}{3} \overset{\text{SET}}{=} 0$$

$$2x = \frac{8}{3}$$

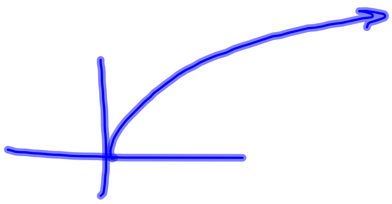
$$x = \frac{8}{6} = \boxed{\frac{4}{3} = x}$$



Minimize distance from
x^2-2x+4 to $(3,-5)$

$D=\sqrt{(x-3)^2+(y-(-5))^2}$

$\sqrt{*}$ is increasing func of $*$



So minimizing D^2
also minimizes D.

$$D^2= x^2-6x+9+\left(x^2-2x+4+5\right)^2$$
$$= x^2-6x+9+(x^2-2x+9)^2$$
$$= x^2-6x+9+$$

$$(x^2-2x+9)(x^2-2x+9)$$
$$= x^4-2x^3+9x^2-2x^3+4x^2-18x+9x^2-18x+81$$
$$= x^4-4x^3+22x^2-36x+81$$

So, $D^2= x^2-6x+9+x^4-4x^3+22x^2\ 36x+81$
$$= x^4-4x^3+23x^2-42x+90$$

$$\frac{d}{dx}\left[\quad\right] = 4x^3-12x^2+46x-42 \overset{\text{set}}{=} 0$$

$$2x^3-6x^2+23x-21=0$$

Doesn't come out cleanly
But a <u>linear</u> function's distance to
a fixed point ain't bad. Expect it on
the final.