Review Sheet

#4/ $s(\theta) = \sqrt{2}(\cos\theta) + \theta$, $0 \le \theta \le 2\pi$

Find where $s'(\theta) = 0$

$s'(\theta) = \sqrt{2}(-\sin\theta) + 1$

$-\sqrt{2}\sin\theta + 1 = 0$

sin^-1(1/√(2)) 45

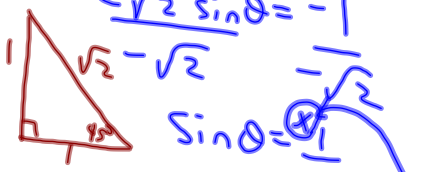
$-\sqrt{2}\sin\theta = -1$

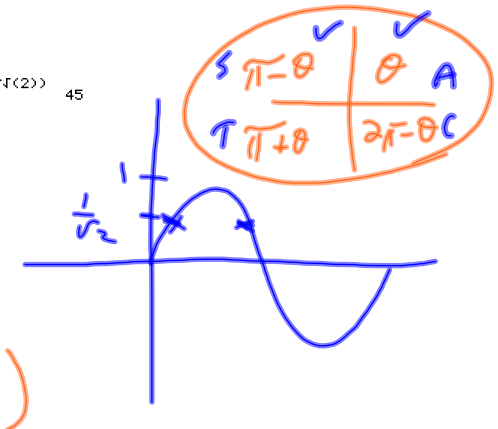
$\sin\theta = \frac{-1}{-\sqrt{2}}$

$\sin\theta = \frac{1}{\sqrt{2}}$

(Ref $\measuredangle$: $45°$, Q 1,2)

$45° \Rightarrow \frac{\pi}{4}$



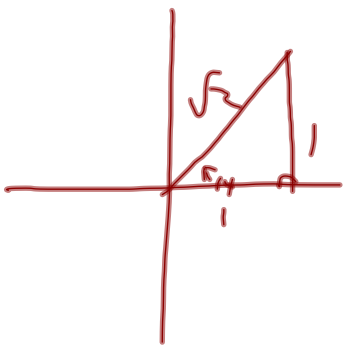


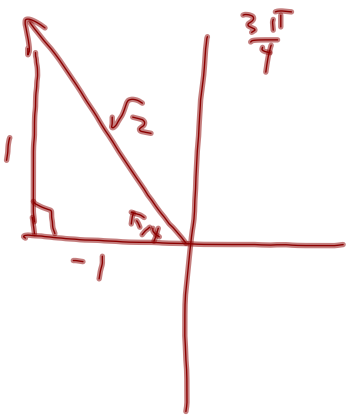
$\theta_1 = \frac{\pi}{4} \Rightarrow y = \sqrt{2}\left(\cos\frac{\pi}{4}\right) + \frac{\pi}{4} = \sqrt{2}\left(\frac{1}{\sqrt{2}}\right) + \frac{\pi}{4} = 1 + \frac{\pi}{4}$

$\theta_2 = \frac{\pi}{1} - \frac{\pi}{4} = \frac{3\pi}{4} \Rightarrow y = \sqrt{2}\left(\cos\frac{3\pi}{4}\right) + \frac{3\pi}{4} = \sqrt{2}\left(\frac{-1}{\sqrt{2}}\right) + \frac{3\pi}{4} = -1 + \frac{3\pi}{4}$

Pts. are:

$\left(\frac{\pi}{4}, 1+\frac{\pi}{4}\right)$ & $\left(\frac{3\pi}{4}, -1+\frac{3\pi}{4}\right)$





6. $s(t) = t^3 - 15t^2 + 72t - 5$ ← displacement

$s'(t) = 3t^2 - 30t + 72$ ← velocity

$s''(t) = 6t - 30$ ← Acceleration
a

a) $a = 12$

$12 = 6t - 30$

$\frac{42}{6} = \frac{6t}{6}$

$7 = t$

$s'(7) = 3(7)^2 - 30(7) + 72$

$= 9 \text{ m/s}$

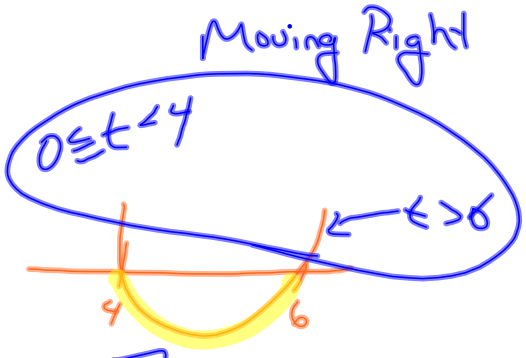
b) $V < 0$

$\frac{3t^2}{3} - \frac{30t}{3} + \frac{72}{3} < \frac{0}{3}$

$t^2 - 10t + 24 < 0$

$(t-6)(t-4) < 0$

$t = 4 \text{ & } 6$

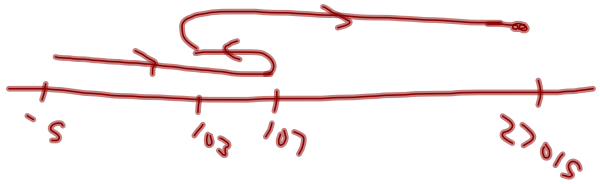


$\{4 < x < 6\}$

c)

t	s
start → 0	−5
4	107
6	103
now → 35	27015

$s = 0$



distance = 112 + 4 + 26912

= 27028 m

5. $f(x)=\frac{x^2-2}{x-2}$ $\perp$ to $x-y+4=0$

$y=x+4$ $\{y=mx+b\}$

$m=1$

$f'(x)=-1$ $\therefore \perp m=-1$

$$f'(x)=\frac{2x(x-2)-(x^2-2)(1)}{(x-2)^2}$$

$$\frac{2x^2-4x-x^2+2}{(x-2)^2}=-1$$

$$\frac{x^2-4x+2}{(x-2)^2}=-1(x-2)^2$$

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

$$\frac{2x^2}{2}-\frac{8x}{2}+\frac{6}{2}=\frac{0}{2}$$

$$x^2-4x+3=0$$

$$(x-3)(x-1)=0$$

$x=3, 1$

$y=\frac{(3)^2-2}{3-2}$

$y=7$

$(3,7)$ $m=-1$

$y-7=-1(x-3)$

$y-7=-x+3$

$y=-x+10$

$y=\frac{(1)^2-2}{1-2}$

$y=\frac{-1}{-1}=1 \Rightarrow (1,1)$, $m=1$

$y-1=-1(x-1)$

$y-1=-x+1$

$y=-x+2$

7. Point of intersection → systems of equations

at $x=5$

$f'(x)=2x+1$

$m=2(5)+1$

$m=11$

$f(5)=(5)^2+5$

$=30$

$(5,30)$, $m=11$

$y-30=11(x-5)$

$y-30=11x-55$

$y=11x-25$

at $x=-1$

$f'(-1)=2(-1)+1$

$=-1$

$m=-1$

$f(-1)=(-1)^2+(-1)$

$=0$

$(-1,0)$, $m=-1$

$y-0=-1(x+1)$

$y=-x-1$

$11x-25=-x-1$

$12x=24$

$x=2$

$y=-2-1$

$y=-3$

$(2,-3)$