(a) Find the velocity at time t.
(b) What is the velocity after 3 s?
(c) When is the particle at rest?
(d) When is the particle moving in the positive direction?
(e) Find the total distance traveled during the first 8 s.
(f) Draw a diagram like Figure 2 to illustrate the motion of the particle.
(g) Find the acceleration at time t and after 3 s.
(h) Graph the position, velocity, and acceleration functions for $0 \le t \le 8$.
(i) When is the particle speeding up? When is it slowing down?

3. $f(t) = \cos(\pi t/4)$, $t \le 10$ $\to$ $0 \le t \le 10$

a) $V(t) = -\frac{\pi}{4} \sin\left(\frac{\pi t}{4}\right)$

b) $V(3) = -\frac{\pi}{4} \sin\left(\frac{3\pi}{4}\right)$

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

$= -\frac{\pi\sqrt{2}}{8}$
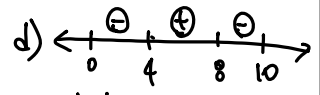
c) $V(t) = 0 = -\frac{\pi}{4} \sin\left(\frac{\pi t}{4}\right)$

$0 = \frac{\pi t}{4} \to t = 0$ $t = \{0, 4, 8\}$

$\pi = \frac{\pi t}{4} \to t = 4$

d)

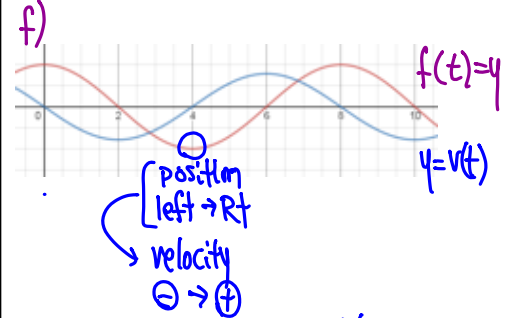$2\pi = \frac{\pi t}{4} \to t = 8$

$3\pi = \frac{\pi t}{4} \to t \ne 12$

ck: $t = 1$
$V(1) = -\frac{\pi}{4} \sin\left(\frac{\pi(1)}{4}\right) < 0$

$(4, 8)$

e) total dist.
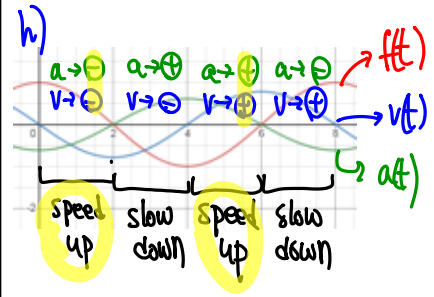
t	S
0	1
4	-1
8	1

$d_1 = 2$
$d_2 = 2$
Total dist: 4

f)

$f(t) = y$

$y = V(t)$

$\left[\begin{array}{l} \text{position} \\ \text{left} \to \text{Rt} \end{array}\right.$

$\to$ velocity
$\ominus \to \oplus$

g) $a(t) = V'(t) = \left(-\frac{\pi}{4} \sin\left(\frac{\pi}{4}t\right)\right)' = -\frac{\pi^2}{16} \cos\left(\frac{\pi}{4}t\right)$

h)

$a \to \ominus$	$a \to \oplus$	$a \to \oplus$	$a \to \ominus$
$v \to \ominus$	$v \to \ominus$	$v \to \oplus$	$v \to \oplus$

$\to f(t)$
$\to V(t)$
$\to a(t)$

speed up | slow down | speed up | slow down

$F = ma$