10.2

49 $\frac{dx}{dt} = 2 + \sin(t^2)$ $\qquad t = 2,\ (3,5)$

(a) $\int_2^4 [2 + \sin(t^2)]\,dt = \cancel{4.324}\ 3.942 + 3 = \boxed{\cancel{7.324}\ 6.942}$

(b) $\frac{dy}{dx} = \frac{\frac{dy}{dt}}{\frac{dx}{dt}} = \frac{-6}{2+\sin 4} = -4.826$

$y - 5 = -4.826(x-3)$

(c) speed $= \sqrt{\left(\frac{dx}{dt}\right)^2 + \left(\frac{dy}{dt}\right)^2}$

$= \sqrt{(2+\sin 4)^2 + (-6)^2} \approx 6.127$

(d) $v = \langle 2 + \sin(t^2), \quad \rangle$

$a = \langle \cos 16\,[8],\ 4 + 2\sin 16 + 56\cos 16 \rangle$

$\frac{dy}{dx} = 2t - 1 = \frac{\frac{dy}{dt}}{\frac{dx}{dt}}$

$2t - 1 = \frac{\frac{dy}{dt}}{2 + \sin(t^2)}$

$\overset{f}{(2t-1)}\,\overset{g}{(2 + \sin(t^2))} = \frac{dy}{dt}$

$2(2 + \sin(t^2)) + 2t\cos t^2 (2t-1)$

$2(2 + \sin 16) + 8\cos 16\,[7]$

$4 + 2\sin 16 + 56\cos 16$

10.2

35 $v = \langle 2\sqrt{2}, 0 \rangle$

speed $= \sqrt{(2\sqrt{2})^2 + 0^2} = 2\sqrt{2}$

$f \quad g$

$x = \sin 4t \cos t$

$\frac{dx}{dt} = 4\cos 4t \cos t +$

$-1 \quad - \sin t \sin 4t$

$4 \cos 4\left(\frac{5\pi}{4}\right) \cos \frac{5\pi}{4} +$

$- \sin\left(\frac{5\pi}{4}\right) \sin 4\left(\frac{5\pi}{4}\right)$

$\overset{0}{y} = \sin 2t$

$\frac{dy}{dt} = 2\cos 2t$

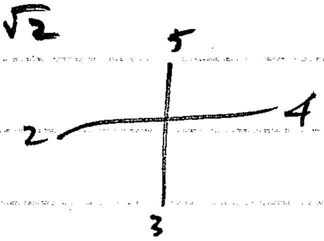
$= 2\cos 2\left(\frac{5\pi}{4}\right)$

$= 2\cos \left(\frac{5\pi}{2}\right)$

$= 0$

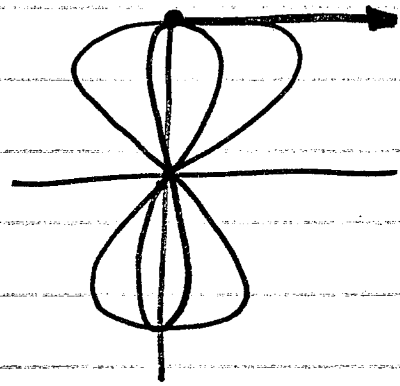
$4(-1)\left(-\frac{\sqrt{2}}{2}\right) + \cancel{-\left(\frac{-\sqrt{2}}{2}\right)}(0)$

$2\sqrt{2}$



$x =$

(b)



$\frac{5\pi}{4} = 3.926$

39 $v = \langle (t+1)^{-1}, (t+2)^{-2} \rangle \qquad t = 0, \ (3, -2)$

(a) $\int_0^3 (t+1)^{-1} = 1.386 + 3 = 4.386$

$(4.386, -1.7)$

$\int_0^3 (t+2)^{-2} = .3 + -2 = -1.7$

(b) $\int_0^3 \sqrt{[(t+1)^{-1}]^2 + [(t+2)^{-2}]^2}\, dt \approx 1.419$

45 (c) $\lim_{t \to \infty}$

$$\lim_{t \to \infty} \left\langle \frac{1-t^2}{1+t^2}, \frac{2t}{1+t^2} \right\rangle = \langle -1, 0 \rangle$$