

Intro to Particle Motion Practice:

1) $v(t) = 3t^2 - 18t + 24 = 0$
 $3(t^2 - 6t + 8) = 0$
 $3(t-2)(t-4) = 0$
 $t = 2, t = 4$

2) omit (answer not there)

3) $s\left(\frac{3\pi}{2}\right) = 3\sin\left(\frac{3\pi}{4}\right) + 1$
 $= \frac{3\sqrt{2}}{2} + 1$
 $s(0) = 3\sin 0 + 1 = 1$

$$\frac{\left(\frac{3\sqrt{2}}{2} + 1\right) - 1}{\frac{3\pi}{2}} = \frac{3\sqrt{2}}{2} \cdot \frac{2}{3\pi}$$

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

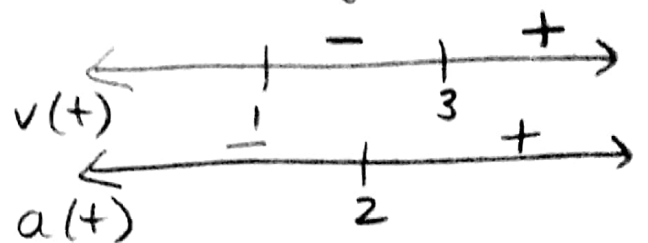
4) omit (not covered yet)

5) $\frac{15 - 10}{2.2 - 1.8} = 12.5 \text{ ft/sec}$

6) $\frac{v(3) - v(0)}{3 - 0} = 12$

*7) $v(t) = 2 + \pi \cos(\pi t)$
 $a(t) = -\pi \sin(\pi t) \cdot \pi$
 $a\left(\frac{3}{2}\right) = \pi^2$

8) $v(t) = 3t^2 - 12t + 9$
 $v(t) = 3(t^2 - 4t + 3)$
 $3(t-1)(t-3) = 0$
 $t = 1, t = 3$
 $a(t) = 6t - 12 = 0$
 $t = 2$



speeding up: $(1, 2) \cup (3, \infty)$

9) $v(t) = 2\cos\left(\frac{1}{2}t\right) \cdot \frac{1}{2}$
 $+ \frac{1}{2}(-\sin(2t) \cdot 2)$
 $v(t) = \cos\left(\frac{1}{2}t\right) - \sin(2t)$

$a(t) = -\sin\left(\frac{1}{2}t\right) \cdot \frac{1}{2} - \cos(2t) \cdot 2$

$a(t) = -\frac{1}{2}\sin\left(\frac{1}{2}t\right) - 2\cos(2t)$

$a(\pi) = -\frac{1}{2}\sin\left(\frac{\pi}{2}\right) - 2\cos(2\pi)$

$a(\pi) = -\frac{1}{2} - 2 = -\frac{5}{2}$

10) $v(t) = 4t^3 - 24t^2 + 36t$ A 13) $a(t) < 0$

B $a(t) = 12t^2 - 48t + 36 = 36$

$a(t) = 12t^2 - 48t = 0$

$12t(t - 4) = 0$

~~$t = 0$~~ , $t = 4$

$t > 0$

11) $v(t) = 3t^2 - 18t + 24$

C $a(t) = 6t - 18 = 0$
 $t = 3$

$v(3) = 3(3)^2 - 18(3) + 24$

$v(3) = -3$

12) $v(t) = -4 \sin\left(\frac{\pi}{2}t\right) \cdot \frac{\pi}{2}$

B $v(t) = -2\pi \sin\left(\frac{\pi}{2}t\right)$

$a(t) = -2\pi \cos\left(\frac{\pi}{2}t\right) \cdot \frac{\pi}{2}$

$a(t) = -\pi^2 \cos\left(\frac{\pi}{2}t\right) = 0$

$\frac{\pi}{2}t = \frac{\pi}{2}$

$t = 1$

$v(1) = -2\pi \sin\left(\frac{\pi}{2}\right)$

$v(1) = -2\pi$

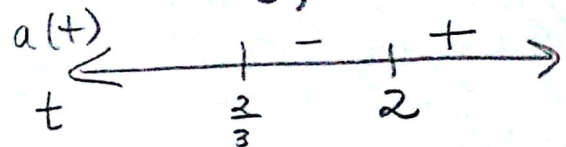
$v(t) = 4t^3 - 16t^2 + 16t$

$a(t) = 12t^2 - 32t + 16$

$0 = 4(3t^2 - 8t + 4)$

$0 = 4(3t - 2)(t - 2)$

$t = \frac{2}{3}, t = 2$



$\left(\frac{2}{3}, 2\right)$

14) $\frac{10.6 - 9.8}{2.0 - 1.5}$

C $= 1.6 \text{ ft/s}^2$

$= 1.6 \text{ ft/s}^2$