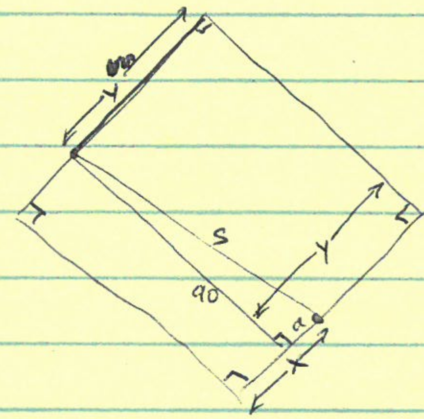
6, 6, 4 = 16 total

MATH 135, Problem Set 8 'B' Solutions

3.10/38

2



$x - d + y - d + d = 90$

$\therefore d = x + y - 90$

Let s be the distance between the runners, x, y the distances traveled along the base paths. Drop a perpendicular to the first base line to form a right triangle (at a general time). From the Pythagorean Theorem

1 $$s^2 = 90^2 + (x + y - 90)^2$$

So 1 $$2s \frac{ds}{dt} = 2(x + y - 90)\left(\frac{dx}{dt} + \frac{dy}{dt}\right)$$

When $x = 30$, $y = 60$, $\frac{dx}{dt} = 20$, $\frac{dy}{dt} = 15$, we get

$$2s \frac{ds}{dt} = 2 \cdot (0) \cdot (35) = 0$$

So $\frac{ds}{dt} = 0$. 2 This means that the distance s is at a <u>minimum</u> at this time. Note $d = x + y - 90 = 0$, so the runners are directly opposite each other and $s = 90$.

4.2/24

$h(t) = (t^2-1)^{1/3}$, so $\boxed{h'(t) = \frac{1}{3}(t^2-1)^{-2/3} \cdot 2t = \frac{2t}{3(t^2-1)^{2/3}}}$ 1

From the formula for $h'(t)$

- $h'(t) = 0$ when $t=0$ 1
- $h'(t)$ dne when $t = \pm 1$ 1

this is consistent with Figure 17 because the graph shows a horizontal tangent at $(0,-1)$, and vertical tangents at $(\pm 1, 0)$ 1

1 on $[0,1]$: min: $h(0) = -1$, max: $h(1) = 0$

1 on $[0,2]$: min: $h(0) = -1$, max $h(2) = 2^{1/3} \doteq 1.26$

4.2/74 $\quad C(t) = \frac{.016t}{t^2+4t+4}$

so $C'(t) = \frac{(t^2+4t+4)(.016) - (.016t)(2t+4)}{(t^2+4t+4)^2}$

$= \frac{-.016t^2 + .064}{(t^2+4t+4)^2}$

2 $C'(t) = 0$ when $t = \pm 2$ (solve $-.016t^2 + .064 = 0$)

but only $t=2$ is in $[0,8]$.

$C(0) = 0 \Leftarrow$ minimum value

2 $C(2) = .002 \Leftarrow$ maximum value

$C(8) = .00128$