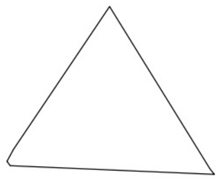
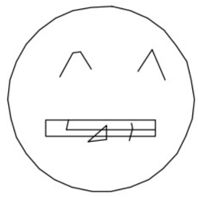
AP Calculus DS

Skeletons





- position, velocity, acceleration
- hw solutions p. 393
- questions ahead of assesment

Particle motion

pos

$\downarrow \frac{d}{dt}$

vel

$\downarrow \frac{d}{dt}$

acc

An object is traveling in a horizontal path.
Its velocity in feet per second can be modeled by the differentiable function $v(t) = -2t^2+16t$ for time t in seconds.

- When is the object standing still in the first 10 seconds?

$v(t) = 0$ ft/sec

$-2t^2+16t = 0$

$-2t(t-8) = 0$

$t=0$ s $\quad t=8$ s

An object is traveling in a horizontal path.
Its velocity in feet per second can be modeled by the differentiable function $v(t) = -2t^2+16t$ for time t in seconds.

Speed speed

- What direction is it traveling in at time t=5? How fast at that time?

$v(5) = ?$ $-2(25)+16(5)$

$-50+80$

30 f/sec

8

An object is traveling in a horizontal path. $\frac{d}{dt}$ v(t) f/sec

Its velocity in feet per second can be modeled by a(t) f/s²

the differentiable function $v(t) = -2t^2+16t$ for time t in seconds.

$v'(t) = a(t) = -4t + 16$

- Is it accelerating or decelerating at time t=2 sec? Include units in your answer.

$a(2) = -4(2) + 16 = 8$ ft/s²

An object is traveling in a horizontal path.
Its velocity in feet per second can be modeled by
the differentiable function $v(t) = -2t^2+16t$ for time t in
seconds.

$a(t) = -4t + 16 = 0$

- When is the object's acceleration zero?

$-4t = -16$

$t = 4$

10. $f(x) = [\ln(2x)]^3$

$$f'(x) = 3[\ln(2x)]^2 \frac{1}{2x}(2)$$

$$= \frac{3}{x}(\ln 2x)^2$$

43. $f(x) = e^{6x}, (0, 1)$

$$f'(x) = 6e^{6x}$$

$$f'(0) = 6e^0 = 6$$

Tangent line: $y - 1 = 6(x - 0)$

$$y = 6x + 1$$

$y = \underline{3}\,\underline{\text{arcsec}(x)}$

$f \quad g$

$f' = 0$

60. $f(x) = 5^{3x}$ $\quad 5^{3x} = (5^3)^x$

$$f'(x) = 3(\ln 5)\, 5^{3x} = 3(\ln 5)\, 125^x$$

63. $g(x) = \log_3\sqrt{1 - x} = \frac{1}{2}\log_3(1 - x)$

$$g'(x) = \left(\frac{1}{2}\right)\frac{-1}{(1 - x)\ln 3} = \frac{1}{2(x - 1)\ln 3}$$

72. $y = \arctan(2x^2 - 3)$

$$y' = \frac{1}{(2x^2 - 3)^2 + 1}(4x)$$

$$= \frac{4x}{4x^4 - 12x^2 + 10}$$

$$= \frac{2x}{2x^4 - 6x^2 + 5}$$

73. $y = x \text{ arcsec } x$

$$y' = \frac{x}{|x|\sqrt{x^2 - 1}} + \text{arcsec } x$$

What is this question asking:

$$f'(x) = \lim_{h \to 0} \frac{\overset{f(x+h)}{\cos(2x+2h)} - \overset{f(x)}{\boxed{\cos(2x)}}}{h}$$

$$f'(x) = \lim_{h \to 0} \frac{f(x+h) - f(x)}{h}$$

How do you find a normal line equation?