hw

$$f(x) = \frac{6x + 10}{x}$$

$f'(-1)$ , $f'(3)$

Take the derivative, plug in -1 and then 3

Hod Hi - Hird Ho / Hollo

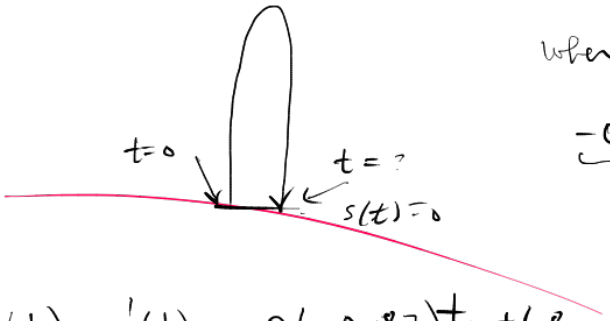
$$f'(x) = \frac{x(6) - (6x+10)\cdot 1}{x^2} = \boxed{\frac{-10}{x^2} = f'(x)}$$

quad formula

$$s(t) = 68t - 0.83t^2 = 0$$

$at^2 + bt + c = 0$

$$t = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$




When will it hit moon?

$-0.83t^2 + 68t = 0$

a b c=0

$$t = \frac{-68 \pm \sqrt{68^2 - 4(-0.83)\cdot 0}}{2(-0.83)}$$

$v(t) = s'(t) = 2(-0.83)t + 68$

$= -1.66t + 68$

$$= \frac{-68 \pm \sqrt{68^2}}{-1.66} = \frac{-68 \pm 68}{-1.66}$$

$$= \frac{0}{-1.66} \text{ & } \frac{-136}{-1.66}$$

start: 0 end

(c)

time to hit ground

81.927

$v(81.927) =$ velocity of object when it hits ground

$$f(x) = -6x^2 + 4$$

want: eqn of tangent line

need: its slope & point on the line = (2, -20)

x = 2

derivative

$x = 2 \longrightarrow f(x)$

$f(2) = -6 \cdot 4 + 4 = -20$

$f'(x) = -12x$

$f'(2) = -24$

= slope of function @ $x = 2$

$y - y_1 = m(x - x_1)$

$y + 20 = -24(x - 2)$

$y = -24x + 28$

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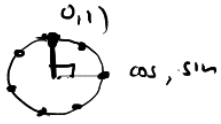
$f(x) = 5$

$f'(x) = 0$

$f'(-1) = 0$




#10

$$f(x) = \frac{5\sin x}{4\sin x + 2\cos x} \quad @\ \pi/2 \quad \frac{5\sin(\pi/2)}{4\sin\frac{\pi}{2} + 2\cos\frac{\pi}{2}} = \frac{5 \cdot 1}{4 \cdot 1 + 2 \cdot 0} = \frac{5}{4}$$

$$f'(x) = \frac{(4\sin x + 2\cos x)5\cos x - 5\sin x(4\cos x - 2\sin x)}{(4\sin x + 2\cos x)^2}$$

$f'(\pi/2) = .625$

$y = f(\pi/2) = 5/4$

$\left(\frac{\pi}{2}, 1.25\right)$ point

$m = .625$

#8

$$f(x) = \sqrt{x}\sin x$$

$$f(x) = x^{\frac{1}{2}} \cdot \sin x$$

$$f'(x) = \tfrac{1}{2}x^{-\frac{1}{2}} \cdot \underbrace{\sin x}_{2^{nd}} + \underbrace{x^{\frac{1}{2}}}_{1^{st}} \cdot \cos(x)$$

product rule

$$= \frac{\sin x}{2\sqrt{x}} + \sqrt{x}\cos(x)$$

#13

$$y = \frac{1}{4\sin x + 3\cos x}$$

slope $m$ = derivative @ $x$ given

point $\left(0, \frac{1}{3}\right)$

with 1 in numerator

Plan: take derivative, plug in $x=0$. that gives the slope then find eqn of line

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

$$= -(4\sin x + 3\cos x)^{-2} \cdot (4\cos(x) - 3\sin(x))$$

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

$$y'(0) = -\frac{4\cos(0) - 3\sin(0)}{(4\sin(0) + 3\cos(0))^2} = -\frac{4 - 3\cdot 0}{(0+3)^2} = -\frac{4}{9}$$

$m = -\frac{4}{9}$

$(x, y) = \left(0, \frac{1}{3}\right)$

$$y - \frac{1}{3} = -\frac{4}{9}(x - 0)$$

$$\boxed{y = -\frac{4}{9}x + \frac{1}{3}}$$