

p. 127

Find the point(s) $f(x)$ has a horizontal tangent line.

(74) $f(x) = \frac{x^2}{x^2+1}$

$f(0) = \frac{0}{0+1} = 0$

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

$0 = 2x^3 + 2x - 2x^3$

$0 = 2x$

$0 = x$ at $(0, 0)$

(82) Use the graph to find:

a) $p'(4)$

$p(x) = f(x)g(x)$

$p'(x) = f'(x)g(x) + g'(x)f(x)$

$p'(4) = f'(4)g(4) + g'(4)f(4)$
 $= (42) \cdot 8 + 0(1) = 4$

b) $q'(7)$

$q(x) = \frac{f(x)}{g(x)}$ $q'(x) = \frac{g(x)f'(x) - f(x)g'(x)}{g(x)^2}$

$q'(7) = \frac{g(7)f'(7) - f(7)g'(7)}{g(7)^2}$

(82) $p(t) = 500 \left(1 + \frac{4t}{500t^2} \right) = \frac{4(71)}{4^2} - \frac{4(-1)}{4^2}$

Find the rate at $t=2 = \frac{8+4}{16} = \frac{12}{16} = \frac{3}{4}$

Use calculator

31.55 batteries/h

Find the second derivative

(94) $f(x) = 8x^6 - 10x^5 + 5x^3$

$f'(x) = 48x^5 - 50x^4 + 15x^2$

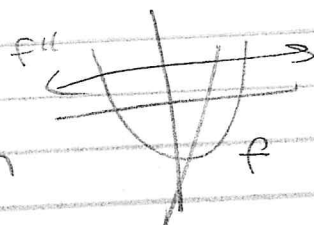
$f''(x) = 240x^4 - 200x^3 + 30x$

(100) $f(x) = \sec x$
 $f'(x) = \sec x \tan x$
 $f''(x) = \sec x \tan x \cdot \tan x + \sec x \sec^2 x$
 $= \sec x \tan^2 x + \sec^3 x$

Find the higher order derivative.
 (102) $f''(x) = 2 - \frac{2}{x} = 2 - 2x^{-1}$
 $f'''(x) = +2x^{-2} = 2/x^2$

(104) $f''(x) = 2x + 1$ $f'(x) = 2$ $f(x) = 0$

(110) Sketch a graph of a differentiable function so $f > 0$ and $f' < 0$ for all x .



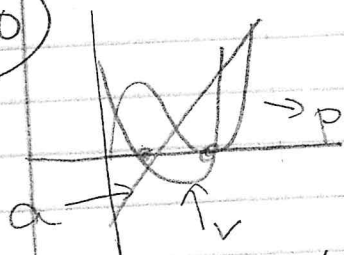
(112) Identify f , f' and f'' →

(118) A car's velocity is $v(t) = \frac{100t}{2t+15}$ ft/sec
 Find the acceleration at 5 seconds

$$v'(t) = a(t) = \frac{(2t+15)100 - 100t(2)}{(2t+15)^2}$$

$$v'(5) = \frac{(10+15)(100 - 100 \cdot 5 \cdot 2)}{(2 \cdot 5 + 15)^2} = 2.4 \text{ ft/s}^2$$

(120)



Identify the position, velocity and acceleration.
 Where does it speed up and slow down?

↓
 $(0, 4/3)$ and $(8/3, 4)$ $(4, 3)$ and $(4, 0)$