Sec 3.1 p 171 7, 11, 17, 19, 21, 23, 25, 27, 29, 31, 33, 35, 37

(7) Find deriv at extreamm.

$$f(x) = \frac{x^2}{x^2+4}$$

$$f'(x) = \frac{(x^2+4)(2x) - x^2(2x)}{(x^2+4)^2}\Bigg|_{x=0} = \frac{0}{16}$$

(11)

$$f(x) = (x+2)^{2/3}$$

$$f'(x) = \frac{2}{3}(x+2)^{-1/3} = \frac{2}{3(x+2)^{1/3}}\Bigg|_{x=-2} = \text{undef}$$

(17) Find crit. #'s

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

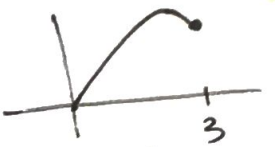
$$f'(x) = 8x - 6$$

$$8x - 6 = 0$$

$$x = \frac{6}{8}$$

(19) $g(t) = t\sqrt{4-t}$, $t < 3$

$$g(t) = \sqrt{4t^2 - t^3}, \quad t < 3$$



product rule

$$t\left[\frac{-1}{2}(4-t)^{-1/2}\right] + (1)\sqrt{4-t}$$

$$(4-t)^{-1/2}\left[\frac{-t}{2} + 4 - t\right]$$

undef at $t = 4$ but $t < 3$

$$-\frac{3}{2}t + 4 = 0$$

$$t = \frac{8}{3}$$

(21) $h(x) = \sin^2 x + \cos x$, $0 < x < 2\pi$

$$h'(x) = 2\sin x \cos x - \sin x$$

$$0 = \sin x(2\cos x - 1)$$

so $x = \pi$, & when

$$2\cos x - 1 = 0$$

$$\cos x = \frac{1}{2}$$

$$\frac{\pi}{3}, \frac{5\pi}{3}$$

(23) Find extremes

$f(x) = 3 - x$ on $[-1, 2]$

$f'(x) = -1$ (never 0 or undefined)

so

x	$f(x)$	
-1	4	max
2	1	min

(25) $h(x) = 5 - 2x^2$ on $[-3, 1]$

$h'(x) = -4x$

when is $-4x = 0$?

$x = 0$

x	-3	0	1
$f(x)$	-13	5	3
	min	max	

(27) $f(x) = x^3 - \frac{3}{2}x^2$ on $[-1, 2]$

$f'(x) = 3x^2 - 3x$

$0 = 3x(x-1)$

when $x = 0$ or 1

x	-1	0	1	2
$f(x)$	-2.5	0	$-\frac{1}{2}$	2
	min			max

(31) $g(x) = \frac{6x^2}{x-2}$ on $[-2, 1]$

$g'(x) = \frac{(x-2)(12x) - 6x^2(1)}{(x-2)^2}$

$0 = 12x^2 - 24x - 6x^2$

$0 = 6x^2 - 24x$

$0 = 3x(2x-7)$

$x = 0 \quad x = \frac{7}{2} > 1$

x	-2	0	1
$f(x)$	-6	0	-6
	min	max	min

(33) $y = 3 - |t-3|$ on $[-1, 5]$

$$y = \begin{cases} 3-(-1)(t-3), & t \le 3 \\ 3-(t-3), & t \ge 3 \end{cases}$$

$$y = \begin{cases} t, & t \le 3 \\ 6-t, & t > 3 \end{cases}$$

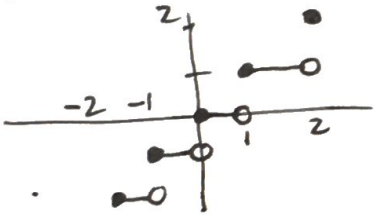
$$y' = \begin{cases} 1, & t \le 3 \\ -1, & t > 3 \end{cases}$$

(never 0)

DNE @ $x = 3$

x	-1	3	5
$f(x)$	-1	3	1
	min	max	

(35) $f(x) = [\![x]\!]$, $[-2, 2]$



x	-2	-1	0	1	2
$f(x)$	-2	-1	0	1	2
	min				max

(37) $f(x) = \sin x$ on $\left[\frac{5\pi}{6}, \frac{11\pi}{6}\right]$

$f'(x) = \cos x$

$0 = \cos x$ when $x = \frac{3\pi}{2}$

x	$\frac{5\pi}{6}$	$\frac{3\pi}{2}$	$\frac{11\pi}{6}$
$f(x)$	$\frac{1}{2}$	-1	$-\frac{1}{2}$
	max	min	