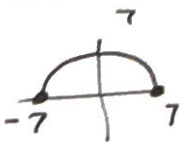
HW 1-5 (1.4 p 84) Page 1

1.4 (p 84) 35*, 43, 45, 47*, 49, 51, 53, 61*

1.5 (p 42) 3*, 9, 11, 13, 16, 17, 21, 25*, 31

Describe the continuity of the interval

(35) $g(x) = \sqrt{49 - x^2}$ on $[-7, 7]$



continuous.

(Find discontinuities)

(43) $f(x) = 3x - \cos x$

(see Th 1.11), $3x$ cont., $\cos x$ cont.
so the difference is cont.

(45) $f(x) = \frac{x}{x^2 - x}$ when is $x^2 - x = 0$?

$x(x-1) = 0$

$x = 0$ or 1

$\lim_{x \to 0} \frac{x}{x(x-1)} = \lim_{x \to 0} \frac{1}{x-1} = -1$

so removable, but $f(0) = -1$

$\lim_{x \to 1} \frac{1}{x-1}$ = DNE (vert asymptote) not removable

(47) $f(x) = \frac{x+2}{x^2 - 3x - 10} = \frac{x+2}{(x+2)(x-5)}$.

$\lim_{x \to -2} f(x) = \frac{1}{-2-7} = \frac{-1}{9}$ removable disc.

$\lim_{x \to 5} f(x) = \frac{1}{0}$, DNE non-removable

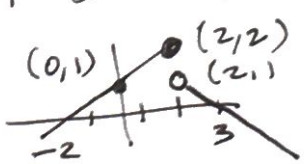
(49) $f(x) = \frac{|x+7|}{x+7}$

$\lim_{x \to 7^-} f(x) = \frac{-(x+7)}{x+7} = -1$

$\lim_{x \to 7^+} f(x) = \frac{x+7}{x+7} = 1$

} so $\lim_{x \to 7} f(x)$ DNE, so non-removable

(51) $f(x) = \begin{cases} \frac{1}{2}x + 1, & x \le 2 \\ 3 - x, & x > 2 \end{cases}$

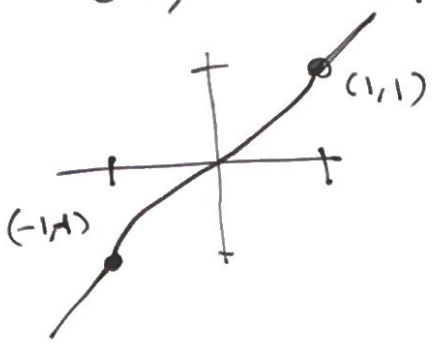


$\lim_{x \to 2^-} f(x) = 2$, $\lim_{x \to 2^+} f(x) = 1$

so $\lim_{x \to 2} f(x)$ DNE, non remov.

(53) $f(x) = \begin{cases} \tan\frac{\pi x}{4}, & |x| < 1 \\ x & |x| \geq 1 \end{cases} = \begin{cases} x, & x \leq 1 \\ \tan\frac{\pi x}{4}, & -1 < x < 1 \\ x, & x \geq 1 \end{cases}$

no removable disc.



(61)

$$f(x) = \begin{cases} x^3 & x \leq 2 \\ ax^2 & x > 2 \end{cases}$$

both polynomials are continuous.
what happens @ $x=2$?

$$\lim_{x \to 2^-} f(x) = \lim_{x \to 2^-} x^3 = 2^3 = 8$$

$$\lim_{x \to 2^+} f(x) = \lim_{x \to 2^+} a x^2 = 4a$$

when does $4a = 8$?
$a = 2$

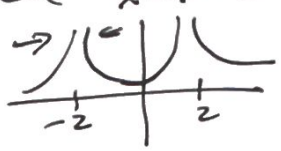
so continues only when $a = 2$

#HW 1–5 (1.5 p 92) page 3 of 3

p92 3, 9, 11, 13, 16, 17, 21, 25, 31

③ Det. limit as $x \to -2^+$ and $x \to -2^-$

$$f(x) = 2\left|\frac{x}{(x-2)(x+2)}\right|$$



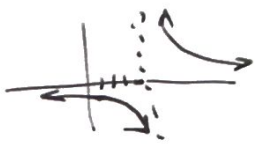
$\lim_{x\to -2^-} f(x) = +\infty$

$\lim_{x\to -2^+} f(x) = +\infty$

⑨ $f(x) = \dfrac{1}{(x-4)^2}$

$\lim_{x\to 4^-} f(x) = -\infty$

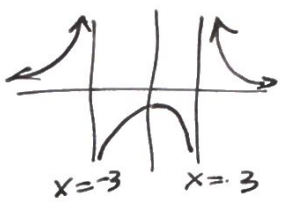
$\lim_{x\to 4^+} f(x) = \infty$



⑪ $f(x) = \dfrac{1}{(x-3)(x+3)}$

$\lim_{x\to -3^-} f(x) = \infty$

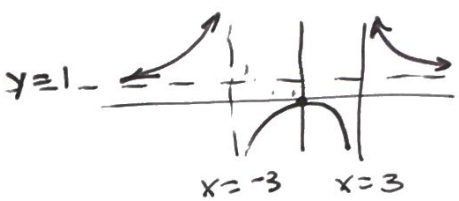
$\lim_{x\to -3^+} f(x) = -\infty$



⑬ $f(x) = \dfrac{x^2}{(x-3)(x+3)}$

$\lim_{x\to -3^-} f(x) = \infty$

$\lim_{x\to -3^+} f(x) = -\infty$



⑯ $f(x) = \tan\dfrac{\pi x}{6}$

$\lim_{x\to -3^-} f(x) = \infty$

$\lim_{x\to 3^+} f(x) = -\infty$

x	-3.1	-3.01	-3.001	-3	-2.999	-2.99
f(x)≈	19.08	190	1909	?	-1909	-190

⑰ $f(x) = \dfrac{1}{x^2}$ vert. asym. at $x = 0$

㉑ $g(t)$ $\dfrac{t-1}{t^2+1}$

$t^2 + 1 > 0$ always

no vert. asym.

㉕ $f(x) = \dfrac{4x^2+4x-24}{x^4-2x^3-9x^2+18x}$

$4x^2 + 4x - 24 = 0$

$4(x^2 + 1 - 6) = 0$

$4(x+3)(x-2) = 0$

$x = \underline{-3}, \underline{2}$ holes at $x = -3, 2$

$x^4 - 2x^3 - 9x^2 + 18x = 0$

$x^2(x^2 - 2x) - 9x(x-2) = 0$

$(x^2 - 9x)(x-2) = 0$

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

$x = 0, 3, \underline{-3}, \underline{2}$

vert. asym at $x = 0, 3$

(31) $s(t) = \dfrac{t}{\sin t}$ $\quad \sin t = 0$ when $t = n\pi$, $n \in \mathbb{Z}$

hole at $x = 0$

vert asymptotes all others $(n\pi,\ n \in \mathbb{Z} - \{0\})$