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Intermediate Value Theorem:

- f is continuous on $[a,b]$
- $f(a) < f(c) = k < f(b)$
- then $a < c < b$

There is a c in $[a,b]$ so $f(c) = k$

(88) Use the IVT to verify a zero exists on the interval $[0,1]$

$f(x) = x^3 + 5x - 3$

- f is continuous on $[0,1]$
- $f(0) = -3$
  $f(1) = 3$ $\rightarrow f(c) = 0$

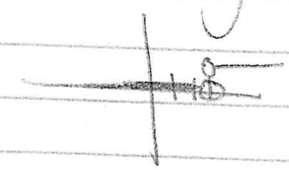
Since $f(0) < f(c) = 4\ f(1)$, there is a value c such that $f(c) = 0$ on $[0,1]$

(94) $f(x) = \frac{x^2+x}{x-1}$ $[5/2, 4]$ $f(c) = 6$

- f is continuous on $[5/2, 4]$
- $f(5/2) = 35/6 = 5\frac{5}{6}$
  $f(4) = 20/3 = 6\frac{2}{3}$ $\rightarrow f(c) = 6$

Since $f(5/2) < f(c) = 6 < f(4)$, there is a value c such that $f(c) = 6$ on $[5/2, 4]$

(90) Sketch a graph. $\lim_{x\to 3^+} f(x) = 1$ $\lim_{x\to 3^-} f(x) = 0$



NOT continuous at $x = 3$

(97) If f and g are always continuous, will f+g always be? yes!

f/g always be? No, g might = 0

(98) a) function with a non-remov. disc at $x=4$ $\quad f(x)=\dfrac{1}{x-4}$

b) function with removable disc at $x=-4$

$f(x)=\dfrac{x+4}{x+4}$

c) $f(x)=\dfrac{x+4}{x^2-16}$

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(2) $\lim\limits_{x\to 4^-}\dfrac{-1}{x-4}=\dfrac{-1}{3.9-4}=\dfrac{-1}{-.001}=\infty$ $\qquad \lim\limits_{x\to 4^+}\dfrac{-1}{x-4}=\dfrac{-1}{4.1-4}=\dfrac{-1}{.1}=-\infty$

(6) $\lim\limits_{x\to 2^+}=\infty$ $\qquad \lim\limits_{x\to 2^-}=-\infty$

Find the vertical asymptotes

(14) $f(x)=\dfrac{4}{(x-2)^3}$ $\quad x=2$

(16) $f(x)=\dfrac{-4}{x^2+4}$ $\quad$ no VA

(18) $h(s)=\dfrac{2s-3}{s^2-25}$ $\quad s=\pm 5$

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

$=\dfrac{4(x^2+x-6)}{x^3(x-2)-9x(x-2)}$

$=\dfrac{4(x+3)\cancel{(x-2)}}{(x^3-9x)\cancel{(x-2)}}$

$=\dfrac{4\cancel{(x+3)}}{x\cancel{(x+3)}(x-3)}$

$\cancel{x=0}$ $x=3$ VA

(30) $f(x)=\sec \pi x$

$x=\dfrac{2n-1}{2}$

(32) $g(\theta)=\dfrac{\tan\theta}{\theta}$

$n\neq\dfrac{(2n+1)\pi}{2}$

(56) Calculator: $f(x)=\dfrac{x^3-1}{x^2+x+1}$ $\quad \lim\limits_{x\to 1^-}=0$