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Math: AP Calc AB 3.5

1. Vertical Asymptotes: N/A

Horizontal Asymptotes:

$\lim_{x\to\infty} \frac{x+1}{\sqrt{x^2+1}}$ $\lim_{x\to-\infty} \frac{x+1}{\sqrt{x^2+1}}$

$= \lim_{x\to\infty} \frac{1+1/x}{\sqrt{1+1/x^2}}$ $= \lim_{x\to-\infty} \frac{1+1/x}{-\sqrt{1+1/x^2}}$

$= 1$ $= -1$

Domain: $\mathbb{R}$ x-int: -1 y-int: 1

No symmetry

$0 = \frac{1-x}{(x^2+1)^{3/2}}$; $x = 1$

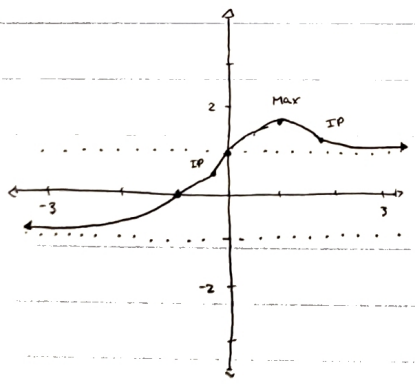
$0 = \frac{2x^2-3x-1}{(x^2+1)^{5/2}}$; $2x^2-3x-1=0$

$x = \frac{3\pm\sqrt{9+8}}{4} = \frac{3\pm\sqrt{17}}{4} \approx -0.28, 1.78$

f'	+	+	−	−
f''	+	−	−	+
Shape	⌣	⌢	⌝	⌣

Max: $(1, \sqrt{2})$ No mins

Inflection: $(-0.28, 0.69)$, $(1.78, 1.36)$



2. Vertical Asymptotes: $x = 0$

Horizontal Asymptote

$\lim_{x\to\infty} \frac{\ln x}{x} = 0$

Domain: $x \in (0, \infty)$ x-int: 1 y-int: N/A

No symmetry

$0 = \frac{1-\ln x}{x^2}$; $x = e$

$0 = \frac{2\ln x - 3}{x^3}$; $2\ln x - 3 = 0$

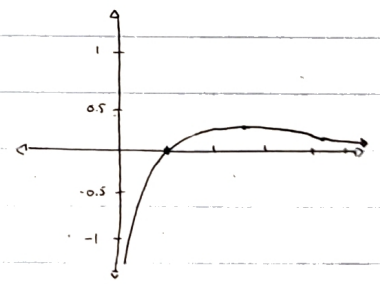
$\ln x = \frac{3}{2}$

$x = e^{3/2}$

f'	+	−	−
f''	−	−	+
Shape	⌜	⌝	⌣

Max: $(e, \frac{1}{e}) \approx (2.71, 0.36)$

Inflection: $(e^{3/2}, \frac{3}{2e^{3/2}}) \approx (4.48, 0.33)$



3. Vertical Asymptotes: $x^2+x-2=0$

$(x+2)(x-1)=0$

$x=-2, 1$

Horizontal Asymptotes

$\lim_{x\to\infty} \frac{1}{x^2+x-2} = 0$

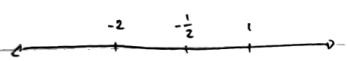
$\lim_{x\to-\infty} \frac{1}{x^2+x-2} = 0$

Domain: $(-\infty,-2)\cup(-2,1)\cup(1,\infty)$ x-int: None y-int: $-\frac{1}{2}$

$0=\frac{-2x-1}{(x^2+x-2)^2}$; $-2x-1=0$ DNE at $-2, 1$

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

$0=\frac{6(x^2+x+1)}{(x-1)^3(x+2)^3}$ DNE at $-2, 1$



f' + + − −

f'' + − − +

Shape ⌣ ⌢ ⌢ ⌣

Max: $\left(-\frac{1}{2}, -\frac{4}{9}\right)$