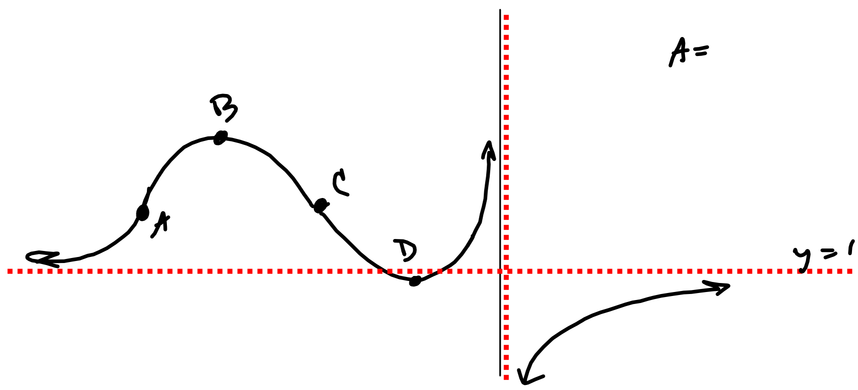
Produce graphs of f that reveal all the important aspects of the curve. Then use calculus to find the intervals of increase and decrease and the intervals of concavity. (Enter your answers in interval notation. Do not round your answers.)

$$f(x) = 1 + \frac{1}{x} + \frac{7}{x^2} + \frac{1}{x^3}$$



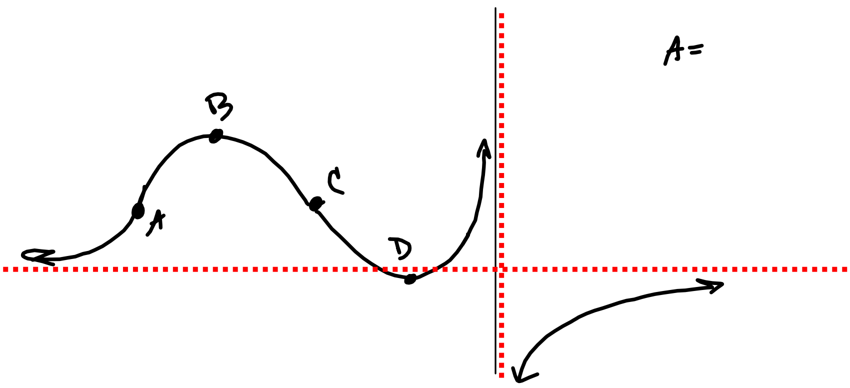
$A = \left(\frac{-21-\sqrt{417}}{2}, f\left(\frac{-21-\sqrt{417}}{2}\right)\right)$ I.P. $\approx \left(\frac{-21-\sqrt{417}}{2}, .9679\right)$

$B = \left(-7-\sqrt{46}, f(-7-\sqrt{46})\right)$ MAX $\approx \left(-7-\sqrt{46}, .9639\right)$

$C = \left(\frac{-21+\sqrt{417}}{2}, f\left(\frac{-21+\sqrt{417}}{2}\right)\right)$ I.P. $\approx \left(\frac{-21+\sqrt{417}}{2}, 39.8237\right)$

$D = \left(-7+\sqrt{46}, f(-7+\sqrt{46})\right)$ MIN $\approx \left(-7+\sqrt{46}, 47.1842\right)$

0.9679224558



A=

$A = \left(\frac{-21-\sqrt{417}}{2}, f\left(\frac{-21-\sqrt{417}}{2}\right)\right)$ I.P.

$B = \left(-7-\sqrt{46}, f(-7-\sqrt{46})\right)$ MAX

$C = \left(\frac{-21+\sqrt{417}}{2}, f\left(\frac{-21+\sqrt{417}}{2}\right)\right)$ I.P.

$D = \left(-7+\sqrt{46}, f(-7+\sqrt{46})\right)$ MIN

$$\left[f(-7-\sqrt{46}), f(-7+\sqrt{46}), f\left(-\frac{21}{2}+\frac{\sqrt{417}}{2}\right), f\left(-\frac{21}{2}-\frac{\sqrt{417}}{2}\right)\right]$$

[0.9639126501, 47.18423548, 39.82374447, 0.9679224558]

B D C A

$A = \left(\frac{-21-\sqrt{417}}{2}, f\left(\frac{-21-\sqrt{417}}{2}\right)\right)$ I.P. $\approx \left(\frac{-21-\sqrt{417}}{2}, .9679\right)$

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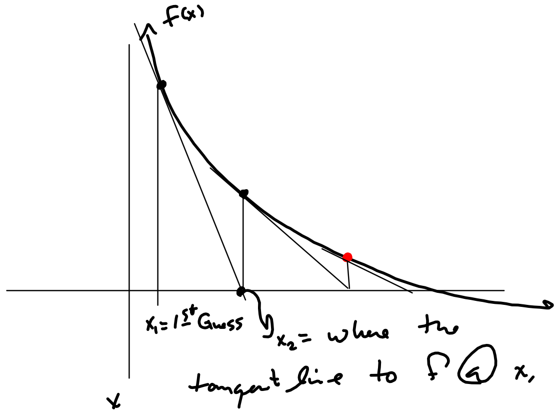
$D = \left(-7+\sqrt{46}, f(-7+\sqrt{46})\right)$ MIN $\approx (-7+\sqrt{46}, 47.1842)$

I'll re-do that graph I left off on Wednesday.

It's clear there's something messed-up.

I got two different sign patterns for f ' and that needs to be resolved on *my* time.

Newton's Method.



x_2 = where the tangent line to f @ x_1 intersects the x-axis.

Do same for $x_2, x_3, \ldots$

$$L_{x_1}(x) = f'(x_1)(x - x_1) + f(x_1) = f(x_1) + f'(x_1)(x - x_1)$$

set $= 0$ →

$$f'(x_1)(x - x_1) + f(x_1) = 0$$

$$f'(x_1)x - f'(x_1)x_1 = -f(x_1)$$

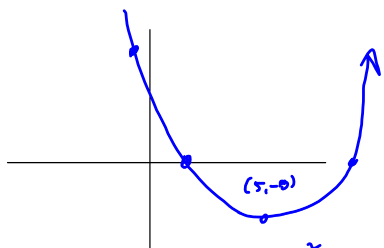
$$\rightarrow f'(x_1)x = f'(x_1)x_1 - f(x_1)$$

$$x = \frac{f'(x_1)x_1}{f'(x_1)} - \frac{f(x_1)}{f'(x_1)}$$

$$x = x_2 = x_1 - \frac{f(x_1)}{f'(x_1)}$$

$$\vdots$$

$$x_{n+1} = x_n - \frac{f(x_n)}{f'(x_n)}$$



$f(x) = (x-5)^2 - 8 \overset{\text{set}}{=} 0$

$x = 5 \pm 2\sqrt{2}$

$x_1 = -1$

$f'(x) = 2(x-5) = 2x - 10$

$f(-1) = 28$

$f'(-1) = -12$

$x_2 = x_1 - \frac{f(-1)}{f'(-1)} = -1 - \frac{28}{-12}$, etc.