Welcome back to MAT137- Section L5101

- Assignment #5 due on Dec 20.
- **Next class: No videos!**

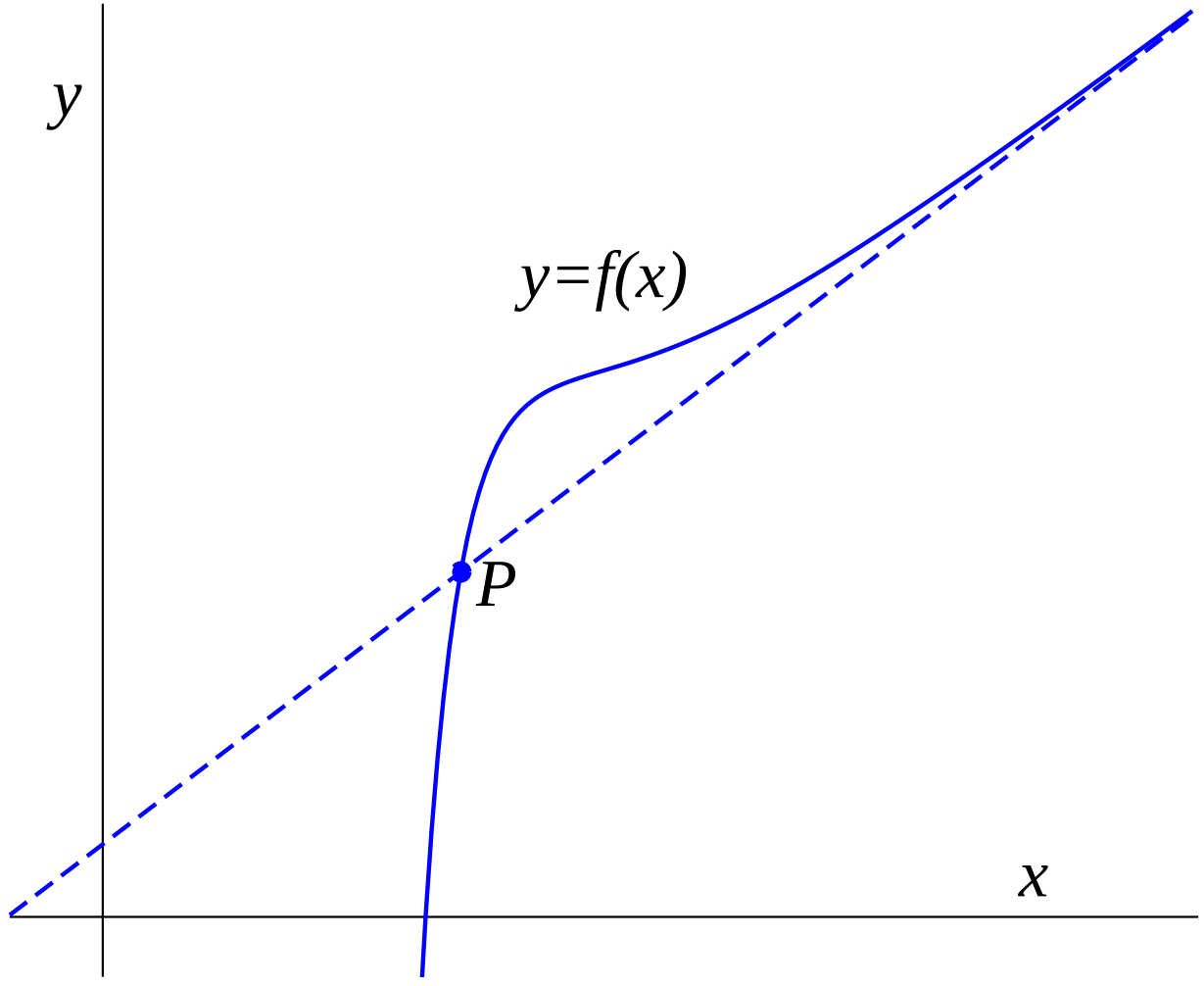
Let's get started!!

Today's videos: 6.15, 6.16, 6.17, (6.18)
Today's topic: Asymptotes

Any question from previous class?

Find the coordinates of P

$$f(x) = 3x + 4 + \frac{2x - 10}{x^2}$$



Monotonicity and concavity

Let $f(x) = xe^{-x^2/2}$.

1. Find the intervals where f is increasing or decreasing, and its local extrema.
2. Find the intervals where f is concave up or concave down, and its inflection points.
3. Calculate $\lim_{x\to\infty} f(x)$ and $\lim_{x\to-\infty} f(x)$.
4. Using this information, sketch the graph of f.

Fractional exponents

Let $h(x) = \dfrac{x^{2/3}}{(x-1)^{2/3}}$. Its first two derviatives are

$$h'(x) = \frac{-2}{3x^{1/3}(x-1)^{5/3}} \qquad h''(x) = \frac{2(6x-1)}{9x^{4/3}(x-1)^{8/3}}$$

1. Find all asymptotes of h
2. Study the monotonicity of h and local extrema
3. Study the concavity of h and inflection points
4. With this information, sketch the graph of h

Hyperbolic tangent

The function tanh, defined by

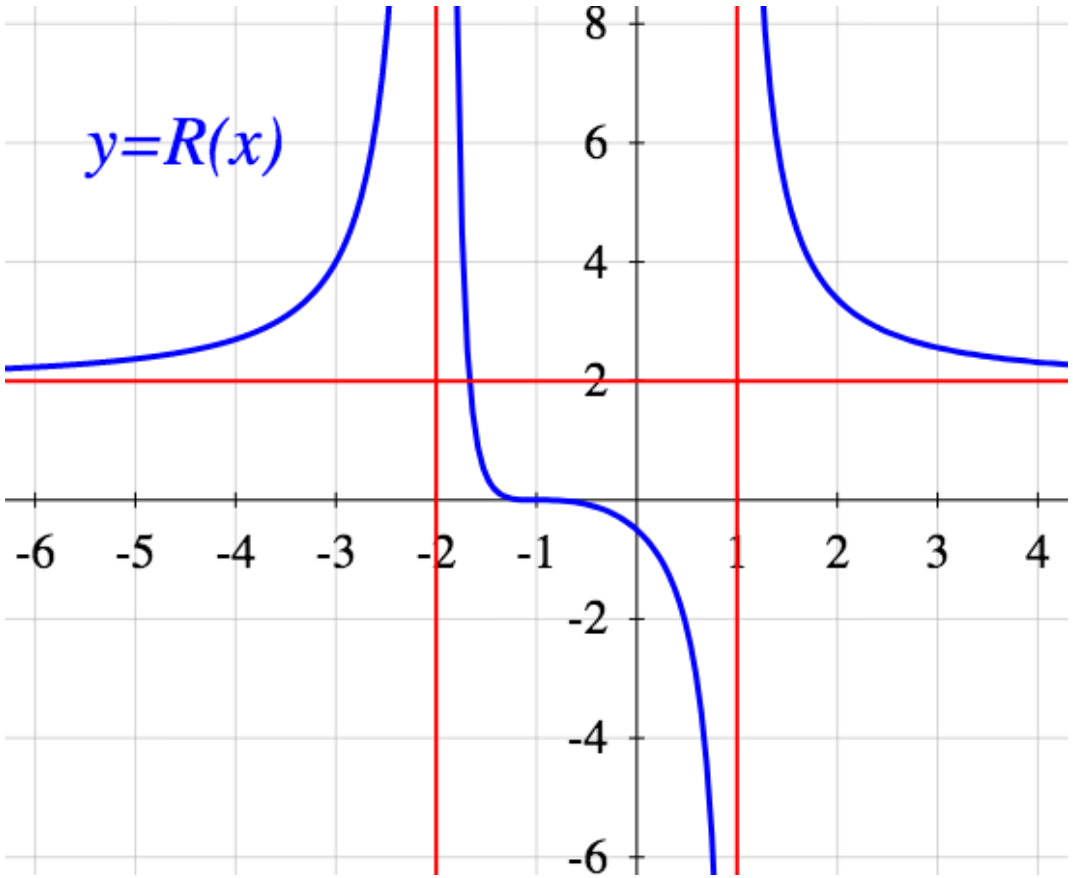
$$\tanh x = \frac{e^x - e^{-x}}{e^x + e^{-x}},$$

is called the "hyperbolic tangent".

1. Find its two asymptotes
2. Study its monotonicity
3. Study its concavity
4. With this information, sketch its graph.

Backwards graphing

R is a rational function (a quotient of polynomials). Find its equation.



Suggestion: Play around with Desmos.

Unexpected asymptotes

Find the two asymptotes of the function

$$F(x) = x + \sqrt{x^2 + x}$$

Hint: The behaviour as $x \to \infty$ is very different from $x \to -\infty$.

Fill out this survey

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