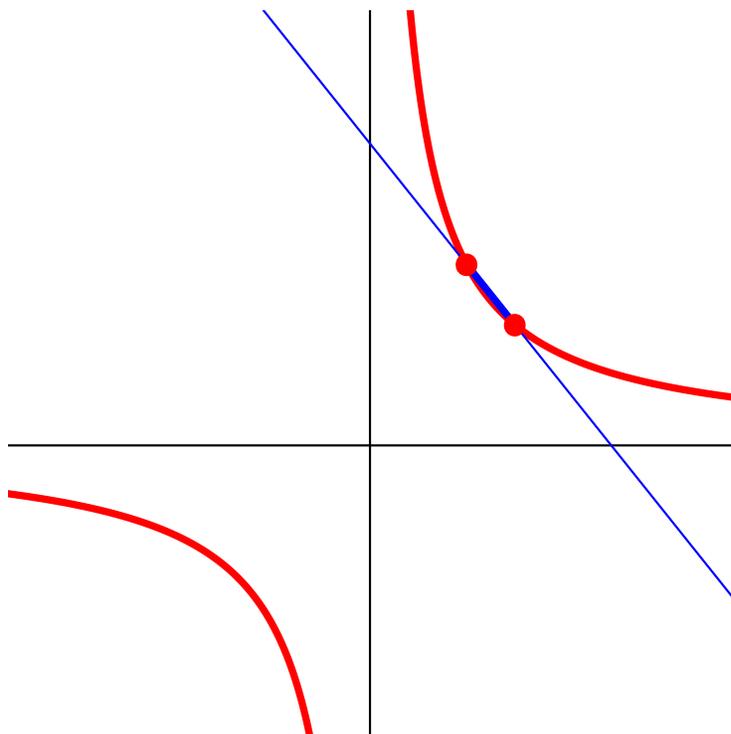## Lecture 7: Worksheet

Rate of change

We compute the derivative of $f(x) = 1/x$ by taking limits.

a) Simplify $\frac{1}{x+h} - \frac{1}{x}$.

b) Now take the limit $\frac{1}{h}[\frac{1}{x+h} - \frac{1}{x}]$ when $h \to 0$.

c) Is there any point where $f'(x) > 0$?

Derivatives

Differentiation rules

$$\frac{d}{dx}x^n = nx^{n-1}$$

$$e^{ax} = ae^{ax}$$

$$\frac{d}{dx}\cos(ax) = -a\sin(ax)$$

$$\frac{d}{dx}\sin(ax) = a\cos(ax)$$

1 Find the derivatives of the function $f(x) = \sin(3x) + x^5$

2 Find the derivative of $f(x) = \cos(7x) - 8x^4$.

3 Find the derivative of $f(x) = e^{5x} + \cos(2x)$.