Today's topics and news

- Topic: Local and global extrema
- **Homework:** Watch videos 5.5 - 5.9 for Tuesday and 5.10 - 5.12 for Wednesday.

Standard choice of restrictions

We make the following standard choice of restrictions when we define the inverse trig functions:

1. $\sin(x)$ restricted to $[-\frac{\pi}{2}, \frac{\pi}{2}]$.
2. $\cos(x)$ restricted to $[0, \pi]$.
3. $\tan(x)$ restricted to $(-\frac{\pi}{2}, \frac{\pi}{2})$.
4. $\csc(x)$ restricted to $[-\frac{\pi}{2}, 0) \cup (0, \frac{\pi}{2}]$.
5. $\sec(x)$ restricted to $[0, \frac{\pi}{2}) \cup (\frac{\pi}{2}, \pi]$.
6. $\cot(x)$ restricted to $(0, \pi)$.

Warm-up: developing $\arctan_2$

Let's define $\arctan_2(x)$ as the inverse of the restriction of $\tan(x)$ to the interval $(\frac{\pi}{2}, \frac{3\pi}{2})$. Find the following:

1. The domain and the range of $\arctan_2$.

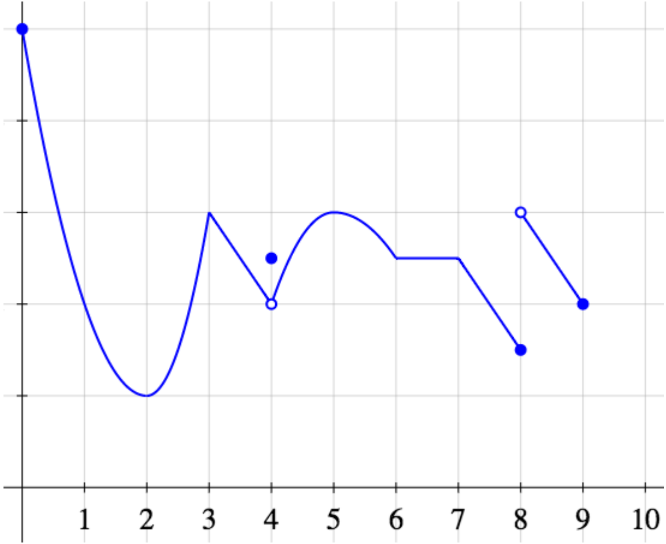
2. A graph of $\arctan_2$.

3. $\tan(\arctan_2(12))$, $\arctan_2(\tan(0))$, $\arctan_2(\tan(\pi))$, $\arctan_2(\tan(7))$

4. Compute the derivative of $\arctan_2$. Hint: You can actually do this without computation if you remember the derivative of arctan!

Definition of local extremum

Find local and global extrema of the function with this graph:



Where is the local extrema?

We know the following about the function h:

- The domain of h is $(-4, 4)$.
- h is continuous on its domain.
- h is differentiable on its domain, except at 0.
- $h'(x) = 0 \quad \iff \quad x = -1$ or 1.

What can you conclude about the local extrema of h?

1. h has a local extrema at $x = -1$, or 1.
2. h has a local extrema at $x = -1, 0$, or 1.
3. h has a local extrema at $x = -4, 1, 0, 1$, or 4.
4. None of the above.

Fractional exponents

Let $g(x) = x^{2/3}(x-1)^3$.

Find local and global extrema of g on $[-1, 2]$.