INVERSE TRIGONOMETRIC FUNCTIONS (ATTENDANCE QUIZ)

COLTON GRAINGER (MATH 1300)

Your name (print clearly in capital letters): _____

This is an **ungraded** quiz that will count for attendance today. It's due at the end of recitation. Dig in!

Apéritif (definitions)

A **function** is a rule f that assigns to each element of a set A to *exactly one* element of a set B. We write

$$f\colon A \to B$$

to display all the ingredients together. The set A is called the **domain** of f, and the set B is called the **codomain** (or **range**) of f. We often represent the "data" of a function $f\colon A \to B$ by plotting its **graph**. For example, the graph of the function $\arctan\colon \mathbf{R} \to (-\frac{\pi}{2}, \frac{\pi}{2})$ is the set of *coordinate pairs*

$$\{(t, \arctan(t)) : \text{ for all } t \text{ in the domain } \mathbf{R}\}.$$

For the following questions, you may find it helpful to look at plots of the graphs of *arctangent*, *arcsine*, and *arccosine* on the back of this sheet.

Hors d'oeuvre (multiple choice)

1. arcsin assigns elements of the set [?] to the set [?]

   (A) $[-1, 1] \to [0, \pi]$
   (B) $[-1, 1] \to [-\frac{\pi}{2}, \frac{\pi}{2}]$
   (C) $[-\frac{\pi}{2}, \frac{\pi}{2}] \to [-1, 1]$
   (D) All of the above
   (E) None of the above

   Your answer: _____

2. arccos assigns elements of the set [?] to the set [?]

   (A) $[-1, 1] \to [0, \pi]$
   (B) $[-1, 1] \to [-\frac{\pi}{2}, \frac{\pi}{2}]$
   (C) $[-\frac{\pi}{2}, \frac{\pi}{2}] \to [-1, 1]$
   (D) All of the above
   (E) None of the above

   Your answer: _____

3. One of these functions has a horizontal asymptote as $x \to +\infty$ and a horizontal asymptote as $x \to -\infty$, with the limiting values for $+\infty$ and $-\infty$ being *different*. Identify the function.

   (A) $f(x) := \ln|x|$.
   (B) $f(x) := \arctan x$.
   (C) $f(x) := e^{-x}$.
   (D) $f(x) := e^{-x^2}$.

   Your answer: _____

Date: 2019-03-06.
Git Repo: `https://github.com/coltongrainger/fy19ta`.

Digestif (True or False)

4. Recall that an **open interval** (a, b) is the set of real numbers $\{x : a < x < b\}$. Extending this notion, we say that a subset U of $\mathbf{R}$ is **open** if

   - for each point $x \in O$,
   - there's an open interval (a, b) such that
     - the point x is an element of (a, b), and
     - the set (a, b) is contained in O.

   TRUE or FALSE: The domain of arctan is open.

   Your answer: _____

Graphs of the promised functions

The **Cartesian plane**, denoted $\mathbf{R}^2$, is the set of coordinate pairs

$$\{(x, y) : \text{ for all real numbers } x \text{ and } y\}.$$

So, here are graphs of the inverse trigonometric functions. They are subsets of the Cartesian plane!

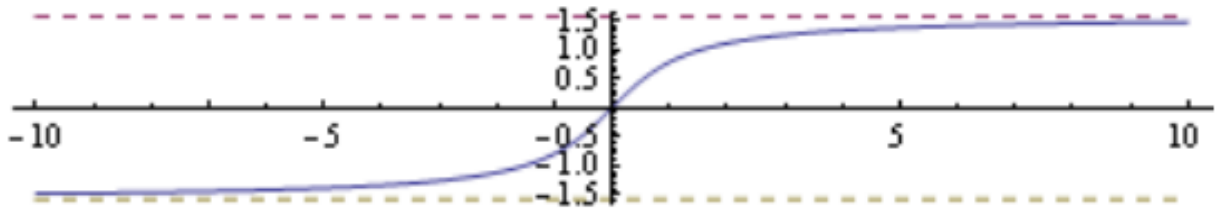

Figure 1. Arctangent

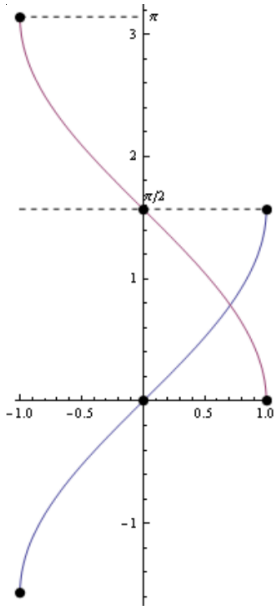

Figure 2. Arcsine and Arcosine

References

- Vipul Naik made the plots and wrote question 3. See `https://vipulnaik.com/math-152/`.
- I am borrowing *cuisine* as a quiz theme from Hiro Lee Tanaka.