

Math 1A Worksheet 18

March 14th, 2008

1. By drawing appropriate triangles and thinking hard, find the following:
 - a) $\sin(\cos^{-1} x)$ and $\cos(\sin^{-1} x)$.
 - b) $\cos^{-1}(\sin x)$ and $\sin^{-1}(\cos x)$.
2. Sketch a graph of $h(x) = \cos^{-1}(\sin x)$, and find $h'(x)$, where it exists.
3. A freshly roasted turkey (a piping-hot 70 degrees Celsius!) floats in the vacuum of space (a frigid -270 degrees C!). Just ten minutes later, the turkey has reached an unappetizing -20 degrees C. Find an equation describing the turkey's temperature, and use it to find the initial rate of cooling of the turkey. Avoid asking existential questions.
4. You travel back in time to the year 0 AD (remember what we just said about existential questions!), where you invest a single penny at a continuously compounded interest rate of just 1 percent. You return to the present time, track down the banker's (great)⁶⁰-grandnephew, and collect... how much?

[Note: also ignore such issues as “who would accept pennies seventeen hundred years before the founding of America?” or “what sort of banker keeps tabs for 2000 years?”]