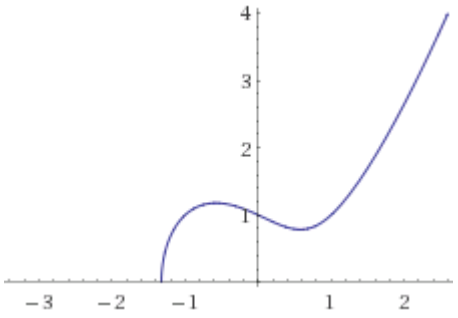
Discussion Problems for Math 180

Tuesday, October 14

1. (a) Does $\sin(x+y) = \sin(x) + \sin(y)$?
   (b) Does $\sqrt{x^2+1} = x+1$?
   (c) Does $\log(x+y) = \log(x) + \log(y)$?
   (d) Does $\sqrt[3]{x+y} = \sqrt[3]{x} + \sqrt[3]{y}$?
   (e) Does $\sin^{-1}(x+y) = \sin^{-1}(x) + \sin^{-1}(y)$?
   (f) Does $(x+y)^4 = x^4 + y^4$?
   (g) If $f(x+y) = f(x) + f(y)$ and f is a continuous function, then $f(x) = \ldots\ldots$

2. The function $c(t)$ has the following graph:



   (a) What is the domain of $c(t)$?
   (b) What is the range of $c(t)$?
   (c) Sketch a graph of $c'(t)$.

3. Find the minimum and maximum of $y = 2x^3 - 4x + 3$ on $[-2, 2]$.

4. Find the minimum and maximum of $y = x^5 - x + 1$ on $[0, 2]$.

5. *Note: Sometimes we write* $\exp(x)$ *instead of* e^x *when the exponent is big enough to get messy. I hope you've seen this in class already, but if not, that's what this notation means.*

   The distribution of American men's heights, in inches, is (roughly) given by

$$p(h) = \frac{2}{7\sqrt{2\pi}} \exp\left(\frac{-2}{49}h^2 + \frac{40}{7}h - 200\right)$$

   According to this model, which height is most common among American men?

6. Consider taking a number to its own power: for instance, $1^1 = 1$ and $2^2 = 4$, while

$$\left(\frac{1}{2}\right)^{1/2} = \frac{1}{\sqrt{2}} \approx 0.7071,$$

   and so on. Which **positive** number, taken to its own power, gives the smallest result?