Math 180 Discussion Problems

Thursday, October 9, 2014

1. *Have you reviewed trigonometry?*

    (a) Sketch the graph of the sine function on the interval $[-2\pi, 2\pi]$.

    (b) What is the domain of the function $\sin^{-1}$? *(More than one possible answer depending on exactly which function you call $\sin^{-1}$. Just give one reasonable answer.)*

    (c) Is the following argument correct? If not, fix it.

$$\sin^{-1}(1) = \sin^{-1}\left(\frac{1}{2}\right) + \sin^{-1}\left(\frac{1}{2}\right) = \frac{\pi}{6} + \frac{\pi}{6} = \frac{\pi}{3}$$

2. *How about logarithms?*

    (a) Is the following argument correct? If not, fix it.

$$\ln(x^2/y) = \ln(x^2) - \ln(y) = 2\ln(x) - \ln(y)$$

    (b) Sketch a graph of the curve

$$\ln(x^2/y) = 0$$

    Be careful about the domain!

3. If $f(x) = \sin^2(x)$, what is $f^{-1}(x)$?

4. If $g(x) = x^x$, what is $g'(x)$?

5. Find all points at which the curve $x^2 - y^2 = x^4$ has horizontal or vertical tangents.

6. (a) If $x = \sin y$, express $\dfrac{dy}{dx}$ in terms of x.

    (b) Simplify your answer to part (a) to eliminate all the trig functions. *(Draw a triangle.)*

7. Evaluate the limit, justifying your answer completely.

$$\lim_{x \to \infty} \frac{\sin(x) - \sqrt{4x^2 - 1}}{x - \cos^2(x)}$$