

**Quiz 9. Math 10-270. April 18, 2012. Name**

1. The study of the ideal arch produced the equations  $C(x) \sin \theta(x) = -w \int_{-b}^x \sqrt{1 + f'(t)^2} dt + \text{const}$  and  $C(x) \cos \theta(x) = C_0$ . Draw a careful diagram of an ideal arch. Use it to explain the meanings of the terms on the left and right sides of the two equations.

2. Determine an expression for the constant “const” of the first equation in (1). Then solve the two equations for  $C(x)$ .

3. A string under tension has length  $L$ . Plucking it produces a tone of frequency  $f$ . What are the lengths of the strings that produce (under the same tension) the second, third, fourth, and fifth harmonics?