

Quiz 9a. Math 10-270. April 20, 2012. Name

1. Our study of the ideal arch developed the equation $C(x) \sin \theta(x) = -w \int_{-b}^x \sqrt{1 + f'(t)^2} dt + \text{const.}$
- Draw a careful diagram of an ideal arch that includes the graph of the center curve $y = f(x)$. Use your diagram to explain the meaning of the terms $C(x)$, $\theta(x)$, $C(x) \sin \theta(x)$, w , and b . Also use your diagram to explain the meaning of the integral $\int_{-b}^x \sqrt{1 + f'(t)^2} dt$.

2. Why did architects of the Renaissance regard the use of the number sequence 1, 2, 3, 4, . . . derived from Pythagoras's musical ratios to be of importance in the designs of their plans and elevations?

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?