

Math Xb Spring 2004
Worksheet: Trigonometric Identities
March 10, 2004

1. Use the angle-addition formulas and the symmetry properties of sine and cosine to verify the following angle subtraction formula.

$$\sin(x - y) = \sin x \cos y - \sin y \cos x$$

2. Use the angle-addition formulas to verify the following double-angle formula.

$$\sin 2x = 2 \sin x \cos x$$

3. Use the double-angle formulas for cosine to verify the following power-reducing formula.

$$\sin^2 x = \frac{1}{2}(1 - \cos 2x)$$

4. Use the Pythagorean identity $\sin^2 x + \cos^2 x = 1$ to verify the following Pythagorean identity.

$$1 + \cot^2 x = \csc^2 x$$

5. To find the distance between two points A and B that lie on opposite banks of a river, a surveyor selects a third point C on the same bank of the river as A . The surveyor notes that the distance between A and C is 240 yards, the angle $\angle BAC$ measures 63° , and the angle $\angle ACB$ measures 54° . Approximate the distance between A and B .
6. The angles of elevation of a hot-air balloon from two points A and B on level ground are 24° and 47° , respectively. Points A and B are 8.4 miles apart and the balloon is between the two points, in the same vertical plane. Approximate the height of the balloon above the ground.