**Double Angle Formulas**

Written below are the three double angle identities for sine, cosine and tangent. Note there are 3 identities for . There is no need to memorize all three of them, as the last two can always be determined by using the Pythagorean identity and isolating for either or .

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Before we start working with these identities, let’s demonstrate why these work.

**Ex 1**: Let . Show that the above identities are true.

*Note: ; similarly*

**Ex 2:** Write an equivalent expression for the following using a double identity.

a) b) c)

**Ex 3:** Express as a single cosine or sine function.

a) b) c)

**Ex 4:** If , , find the value of

**Ex 5**: If , find the value of . What quadrant does 4x lie in?

**Ex 6:** Evaluate using exact values.

a) b)

Half Angle Formulas

We know so that .

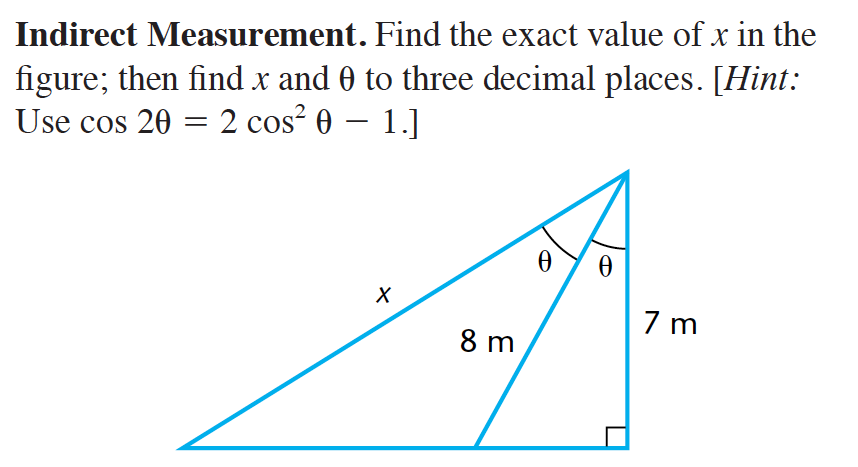
Isolating for we get:

**Ex 7:** Evaluate using exact values.

**Ex 8:** Find the exact values of if where . What quadrant does the angle lie?

**Ex 8:** Prove

**Ex 9:** Prove



**Ex 10:**