Find each exact value:

1) $\sin^{-1}\left(-\dfrac{1}{2}\right)$

2) $\arcsin\left(\dfrac{\sqrt{2}}{2}\right)$

3) $\sin^{-1}4$

4) $\cos^{-1}\left(-\dfrac{\sqrt{3}}{2}\right)$

5) $\cos^{-1}1$

6) $\arccos\left(\dfrac{1}{2}\right)$

7) $\arctan\left(\sqrt{3}\right)$

8) $\tan^{-1}\left(-\dfrac{\sqrt{3}}{3}\right)$

9) $\tan^{-1}(-1)$

10) $\tan^{-1}\left(\cos(\pi)\right)$

11) $\sin^{-1}\left(\cos\left(\dfrac{\pi}{6}\right)\right)$

12) $\arccos\left(\cos\left(\dfrac{5\pi}{4}\right)\right)$

13) $\arcsin\left(\sin\left(\dfrac{5\pi}{3}\right)\right)$

14) $\tan^{-1}\left(\tan(-1)\right)$

15) $\cos^{-1}\left(\cos\left(-\dfrac{2\pi}{3}\right)\right)$

For each question, sketch a picture of the situation. Show all work that leads to your final answer. Answer each question to the thousandths place, using correct units.

1)  The flagpole at Douglas Anderson is 15 feet high. Using a clinometer, Mr. Allen-Black measured an angle of $31.3°$ to the top of the pole. How far from the flagpole is Mr. Allen-Black standing?

2)  Suppose a tree that is 40 feet tall casts a showdown that is 60 feet long.  What is the angle of elevation from the end of the shadow to the top of the tree?

3)  An observer on a cliff 1200 feet above sea level sights two ships due East.  The angles of **depression** to the ships are $48°$ and $33°$.  What is the distance between the ships?

4)  A diver stands on a diving board above 2 swimmers.  The angle of **depression** from the diver to each swimmer is 29 degrees and 44 degrees.  If the swimmers are 6 feet apart, how high the diving board?