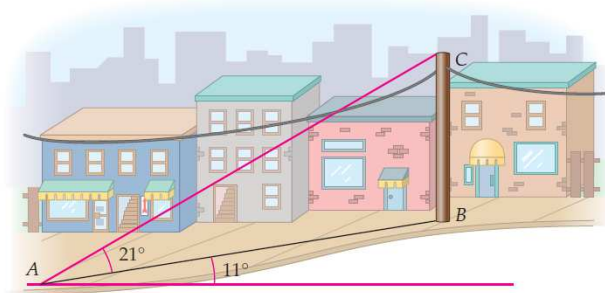Read each problem **very carefully** before starting to solve it. Each problem is worth 10 points. It is necessary to show **all** your work. Correct answers without explanations are worth 0 points. GOOD LUCK!!

1. A telephone pole 35 feet high is situated on an 11° slope from the horizontal. The measure of angle CAB is 21°. Find the length of the wire AC.

2. Use the distances shown in the following figure to determine the depth of the submarine below the surface of the water. Assume that the line segment between the surface ships is directly above the submarine.
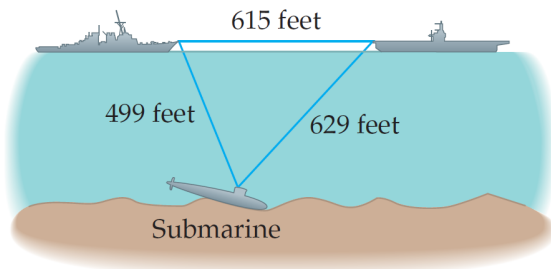
3. Consider the vectors $u = \langle 2, 3 \rangle$ and $v = \langle -1, 7 \rangle$.

(a) Find $3u - 2v$.

(b) Find $\|v - u\|$.

(c) Find a unit vector in the direction of u.

(d) Find the cosine of the least positive angle between u and v.

(e) Find the scalar projection $\text{proj}_u v$.

4. (a) Consider the complex numbers $z = 3 - 2i$ and $w = 1 + i$. Compute zw and leave your answer in standard form.

(b) Consider again the complex numbers $z = 3 - 2i$ and $w = 1 + i$. Compute $\dfrac{z}{w}$ and leave your answer in standard form.

(c) Find the value of i^{843}.

5. Consider the complex numbers $z = 2 - 2i$ and $w = -\sqrt{3} + i$.

   (a) Write z in trigonometric form.

   (b) Write w in trigonometric form.

   (c) Calculate $\dfrac{w}{z}$ using the trigonometric forms and leave your answer in trigonometric form.

   (d) Find the first fifth root of $-16\sqrt{3} + 16i$ and put your answer in standard form.