**PRECALCULUS PROBLEM SESSION #13 SOLUTIONS**

## The Law of Sines

1. The law of sines can be used only if at least one of the angles is known.
2. To use the law of sines we need to know an angle and the side opposite that angle; a pairing which is not given in the SAS case.

3. a) The solution is $B = 100°$, $a \approx 44.8$, and $b \approx 53.3$.
   b) The solution is $A = 90°$, $b \approx 7.9$, and $c \approx 1.4$ .
4. a) There is one triangle and the solution is $B_1$ (or $B$) $\approx 31°$, $C \approx 99°$, and $c \approx 38.7$ .
   b) In one triangle, the solution is $B_1 \approx 27°$, $C_1 \approx 133°$, and $c_1 \approx 64.2$ .
   In the other triangle, $B_2 \approx 153°$, $C_2 \approx 7°$, and $c_2 \approx 10.7$ .

5. The distance between $A$ and $B$ is about 264.4 yards or 793 feet.

6. The pier is about 81 feet long.

7. The height of the wall is about 15.6 feet.

8. None, since the angles of a triangle are bigger than 0°, the sine of any of the three angles is greater than 0.

## The Law of Cosines

1. SSS, SSA, SAS, ASA, AAS
2. a) The solution is $c \approx 7.1$, $B \approx 6°$, and $A \approx 159°$**.**
   b) The solution is $C \approx 127°$, $A \approx 21°$**,** and $B \approx 32°$.
   c) Case 1: $\gamma = 73°,\ \beta = 57°, b = 8.8$
   Case 2: $\gamma = 107°,\ \beta = 23°, b = 8.8$

3. a) Using the Law of Sines gives that $\sin\beta = \frac{b\sin\alpha}{a} \leq 1$, but $\frac{b\sin\alpha}{a} = \frac{13.1sin46.5°}{7.9} = 1.20284 > 1$
   b) Using the Law of Sines gives that $\sin\beta = \frac{b\sin\alpha}{a} \leq 1$, but $\frac{b\sin\alpha}{a} = \frac{150sin123°}{101} = 1.24555 > 1$
4. The distance between $A$ and $B$ is about 113 yards.
5. The guy wire anchored downhill is about 260.2 feet long. The one anchored uphill is about 239.3 feet long.
6. It is about 42.6 feet from the pitcher's mound to third base.