Rubric

AMAT100: PreCalculus
Worksheet 5

Due: Announced In Class or Digitally

—— Instructions ——

- This homework should be submitted in class or digitally on the date listed above.
- **You must show all work**. You may receive zero or reduced points for insufficient work. **Your work must be neatly organised and written**. You may receive zero or reduced points for incoherent work.
- If you are writing your answers on anything other than this sheet, you should only have **one question per page**. You can have parts a), b) and c) on the page for example, but problems 1) and 2) should be on separate pages.
- **Put a box or circle around your final answer** for each question.
- The problems on this assignment will be **graded on correctness and completeness**.
- These problems are designed to be done without a calculator. Whilst there is nothing stopping you using a calculator when working through this assignment, be aware of the fact that you are not permitted to use calculators on exams so you might want to practice without one.

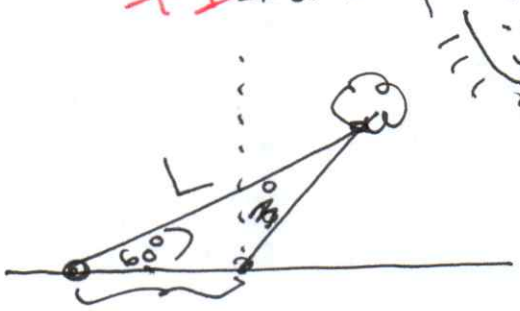
* Pb 1 5 pts
* Pb 2 4 pts
* Pb 3 5 pts
Pb 4 4 pts
Pb 5 6 pts

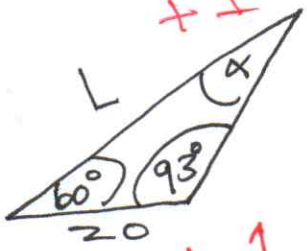
* Extra Credit.

Total : 10 pts
+ 14 pts Extra Credit
24 pts.

1. (Optional or Extra Credit) A big pine tree has grown so that it is tilted 3° from vertical toward the sun. When its shadow is 20 ft long, the angle of elevation from the tip of its shadow to the top of the tree is 60°. Approximately how tall is the tree? (i.e. what is its length)?

+1 Interpretation:





+1
$\alpha = 180 - (60+93)$
$= 27.$

Law of Sines: +1

$$\frac{20}{\sin 27} = \frac{L}{\sin 93}$$

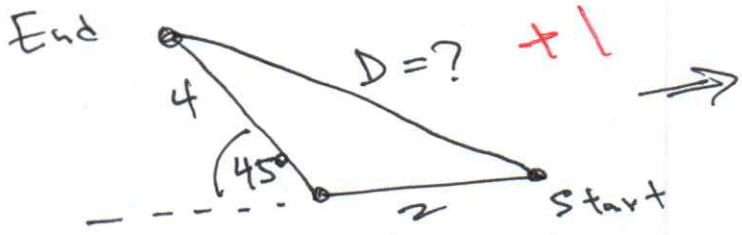
$$L = \frac{20 \sin 93}{\sin 27}$$

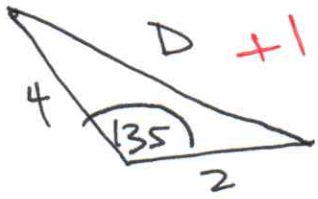
≈ 44 +1

5 pts Total

2. (Optional or Extra Credit) A person leaves his house and walks 2 miles west and then 4 miles northwest. Approximately how far is he from home?

Interpretation:





Law of Cosines: +1

$$D^2 = 4^2 + 2^2 - 2(4)(2)\cos(135°)$$

$$D = \sqrt{20 - 16\cos(135°)} \approx 4.78 \text{ miles.}$$ +1

4 pts Total.

3. (Optional or Extra Credit) Given a triangle with sides $a = 6$, $b = 8$, and $c = 11$, find opposite angles A, B, and C.

$$\measuredangle C = \cos^{-1}\left(\frac{11^2 - (6^2+8^2)}{-2(6)(8)}\right) \approx 102.6^\circ \quad +1$$

$$\measuredangle A = \cos^{-1}\left(\frac{6^2 - (11^2+8^2)}{-2(11)(8)}\right) \approx 32.2^\circ \quad +1$$

$$\measuredangle B \approx 180 - (A + C) = 45.2^\circ \quad +1$$

+1 : Student recognizes the need to use the Law of Cosines to find the first angle.

+1 : Student uses the Law of Sines or Cosines to find the value of the second angle.

5 pts total.

4. Using the double angle formulas, calculate $2\sin(12°)\cos(12°)$.

Recall: $\sin(2\theta) = 2\sin\theta\cos\theta$ +1

So, $2\sin(12)\cos(12)$ +2

$= \sin(2 \cdot 12)$

$= \boxed{\sin(24^\circ)}$ +1

4 pts Total

5. Use the sum and difference formulas to solve the problems below.

(a) Calculate $\cos(57°)\cos(22°) - \sin(57°)\sin(22°)$.

$= \cos(57° + 22°)$

$= \cos(79°)$ + 2

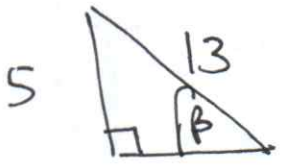
2 pts Total

(b) Suppose $\cos\alpha = \frac{3}{5}$ and $\sin\beta = \frac{5}{13}$, where α is in quadrant I and β is in quadrant II. Find $\sin(\alpha + \beta)$.

$\sin(\alpha+\beta) = \sin\alpha\cos\beta + \cos\alpha\sin\beta$ +1

$= \left(\frac{4}{5}\right)\left(-\frac{12}{13}\right) + \left(\frac{3}{5}\right)\left(\frac{5}{13}\right)$ +1

$= \frac{-48 + 15}{45} = -\frac{33}{45} = \boxed{-\frac{11}{15}}$ +1



$\sqrt{13^2 - 5^2} = 12$

$\cos\beta = \frac{12}{13} \Rightarrow -\frac{12}{13}$ in Quadrant II +1

4 pts Total