

## Week 1 Problems

*Show complete solutions and explanations.*

1. Zach discovers in the library that a book has some number of consecutive pages torn out. Find the page numbers of the missing pages given that their sum is 452 and the print is double-sided.
2. In  $\triangle ABC$ ,  $\angle BAC$  is less than  $90^\circ$ . The perpendiculars from  $C$  on  $AB$  and from  $B$  on  $AC$  intersect the circumcircle of  $\triangle ABC$  again at  $D$  and  $E$  respectively. If  $|DE| = |BC|$ , determine the measure of  $\angle BAC$ .
3. The number  $A$  is composed of  $3^{2016}$  3s and no other digits. Find the highest power of 3 which divides  $A$ .

Posted: Sep. 3, 2016

**Deadline: Sep. 10, 2016, 11:59PM**

### **About the PEM Weekly Problems**

The PEM Weekly Problems aims to challenge and enrich high school students' creativity and critical thinking skills by exposing them to non-routine math problems and puzzles. While the problem sets are primarily intended for PEM participants, everyone is encouraged to submit their solutions to us. We acknowledge on the page everyone who submits correct answers. Moreover, PEM participants who solve the most number of problems will be recognized and awarded during the PEM closing ceremony.

### **Submitting Solutions**

1. Typeset and handwritten solutions are welcome. For handwritten solutions, please scan or take a clear photo of your paper.
2. Indicate in the submission your name, school, and year level.
3. Send your solution to [ateneo.tuklas@gmail.com](mailto:ateneo.tuklas@gmail.com).