

To: Mathematics Faculty  
From: Elgin Johnston

Please announce the Putnam Examination to your classes (165 and above) and encourage good undergraduate students to compete.

The William Lowell Putnam Mathematics Competition is an exam taken each year by thousands of students in the United States and Canada. This years exam will take place on

Saturday, December 6, 2008  
9:00am–12:00 noon and 2:00pm–5:00pm  
Room 408 Carver Hall

Interested students should see Elgin Johnston (396C Carver, ehjohnst@iastate.edu) by noon Monday, October 13, or pick up an application form from the Math Office in 396 Carver. Practice sessions will be held on Thursdays, 4:00-5:30 starting October 16. The location will be available soon.

Here are some sample problems from previous years. Students, if you can do any one of these problem you should consider taking the exam!!

- 1) A right circular cone has base of radius 1 and height 3. A cube is inscribed in the cone so that one face of the cube is contained in the base of the cone. What is the side length of the cube?
- 2) Find the minimum value of

$$\frac{(x + 1/x)^6 - (x^6 + 1/x^6) - 2}{(x + 1/x)^3 + (x^3 + 1/x^3)}$$

for  $x > 0$ .

- 3) Basket Ball star Shanille O'Keal's team statistician keeps track of the number,  $S(N)$ , of successful free throws she has made in her first  $N$  attempts of the season. Early in the season,  $S(N)$  was less than 80% of  $N$ , but by the end of the season,  $S(N)$  was more than 80% of  $N$ . Was there necessarily a moment in between when  $S(N)$  was exactly 80% of  $N$ ?
- 4) Right triangle  $ABC$  has right angle at  $C$  and  $\angle BAC = \theta$ ; the point  $D$  is chosen on  $AB$  so that  $|AC| = |AD| = 1$ ; the point  $E$  is chosen on  $BC$  so that  $\angle CDE = \theta$ . The perpendicular to  $BC$  at  $E$  meets  $AB$  at  $F$ . Evaluate  $\lim_{\theta \rightarrow 0} |EF|$ .