

# Cal Poly Department of Mathematics

## Puzzle of the Week

October 23 - 29, 2009

Set  $P(n) = \prod_{k=1}^n k^k = 1^1 \cdot 2^2 \cdot 3^3 \cdot \dots \cdot n^n$ . Define  $E(n)$  to be the largest positive integer  $k$  for which  $5^k$  divides  $P(n)$ . Find a closed-form formula for  $E(5^m)$  and evaluate

$$\lim_{m \rightarrow \infty} \frac{E(5^m)}{5^{2m}}$$

*Solutions should be submitted to Morgan Sherman:*

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*before next Friday. Those with correct and complete solutions will have their names listed in next week's email announcement. Anybody is welcome to make a submission.*