

Problem \diamond -6

Due in DSC 222 by 12 noon, Friday, February 22, 2019

Problem: Given

$$y = \frac{\sqrt{1+2x} \cdot \sqrt[4]{1+4x} \cdot \sqrt[6]{1+6x} \cdot \dots \cdot \sqrt[98]{1+98x} \sqrt[100]{1+100x}}{\sqrt[3]{1+3x} \cdot \sqrt[5]{1+5x} \cdot \sqrt[7]{1+7x} \cdot \dots \cdot \sqrt[99]{1+99x} \sqrt[101]{1+101x}}$$

find y' at $x = 0$.

RULES:

- The competition is open to all *undergraduate* UNO students and it is supervised by *Upper Curriculum Committee* of the Mathematics Department.
- Submit your solutions to Andrzej Roslanowski in DSC 222 or to his mailbox.
- Every nontrivial step/claim in your solution must be justified. You may cite/quote a result from your textbook, past problems of the week and other widely available sources. In each case you have to give full reference.
- There are no partial credits, so rather err on the side of caution and provide more explanations than less. If you are not sure that your sources/references are appropriate, please include the complete relevant proofs from there.
- Your answers should be written clearly and legibly. We reserve the right to refuse grading your work if it is difficult to read it.
- The winners of Spring 2019 edition of POW will be determined at the end of the semester based on the number of correct solutions submitted.
- Problems will be posted by Friday 5pm and the solutions are due by the following Friday 12 noon.

PRIZES:

- Winners will receive books published by the American Mathematical Society. The titles actually awarded will be selected in cooperation with the awardees.
- Everybody scoring in the POW Competition qualifies for the grand finale:
 $\frac{\pi}{2}$ *Mathematical Competition*.