

Undergraduate Problem Solving Competition

Problem 3 - Piecewise Catastrophe

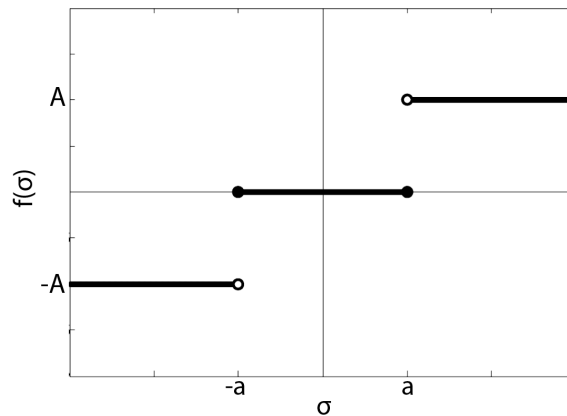
Due Nov. 20, 2017

Introducing the signum function, $sgn(x)$. A piecewise function defined as:

$$sgn(x) = \begin{cases} 1 & \text{if } x > 0 \\ 0 & \text{if } x = 0 \\ -1 & \text{if } x < 0 \end{cases}$$

Using the signum function, derive some explicit function $f(\sigma)$, where

$$f(\sigma) = \begin{cases} A & \text{if } \sigma > a \\ 0 & \text{if } |\sigma| \leq a \\ -A & \text{if } \sigma < -a \end{cases}$$



Answer with an equation $f(\sigma)$. For example, $f(\sigma) = A \cdot sgn\left(\frac{a}{\sigma}\right)^2$

New and old problems are posted online at
<http://www.math.utah.edu/undergrad/involvement.php>
Next problem will be posted January 16th, 2018.

In the spirit of UPSC, you should not use the internet or look up the solution in a book. Please include your **name, student ID number, and email address** on your solution. Submit answers at the front desk of the T. Benny Rushing Mathematics Center.