PROBLEM OF THE MONTH #2

MARCH 2021

Directions: Write a complete solution to the problem below showing all work. Your paper must have your name, W#, and Southeastern email address. Solutions are to be sent as a SINGLE PDF FILE to the submission address talwissubmissions@selu.edu, with the subject heading of the email as Problem of the Month #2 – March 2021, by 11:59 p.m., **Thursday, April 15**. No late papers will be accepted.

All papers with a correct solution will be entered in a drawing for a great prize! Anyone can submit solutions, but only currently enrolled students are eligible for prizes.

Questions concerning the problem of the month should be sent to either Dr. Tilak de Alwis (tdealwis@selu.edu), or Dr. Dennis Merino (dmerino@selu.edu)

PROBLEM: *Optimizing a Function*

Consider the function F defined by the following formula:

$$F(x) = \int_0^{2x} t^5 Cos(t^2)\, dt \quad \text{where} \quad 0 \leq x \leq 3/2$$

(a) Use any type of technology to draw a clear and big graph of the above function $F(x)$ for $0 \leq x \leq 3/2$. Make sure to show all important features of your graph such as maximum and minimum points.

(b) Use any type of technology to find the *approximate* coordinates of the point P of the above graph where we have an absolute maximum for $F(x)$ (two decimal places).

(c) Find the *exact* coordinates of the point P by hand. Provide the simplified answer.

Note: Partial answers might still be considered. So all submissions are welcome!