Mathematics 1120H – Calculus II: Integrals and Series

TRENT UNIVERSITY, Summer 2021 (S62)

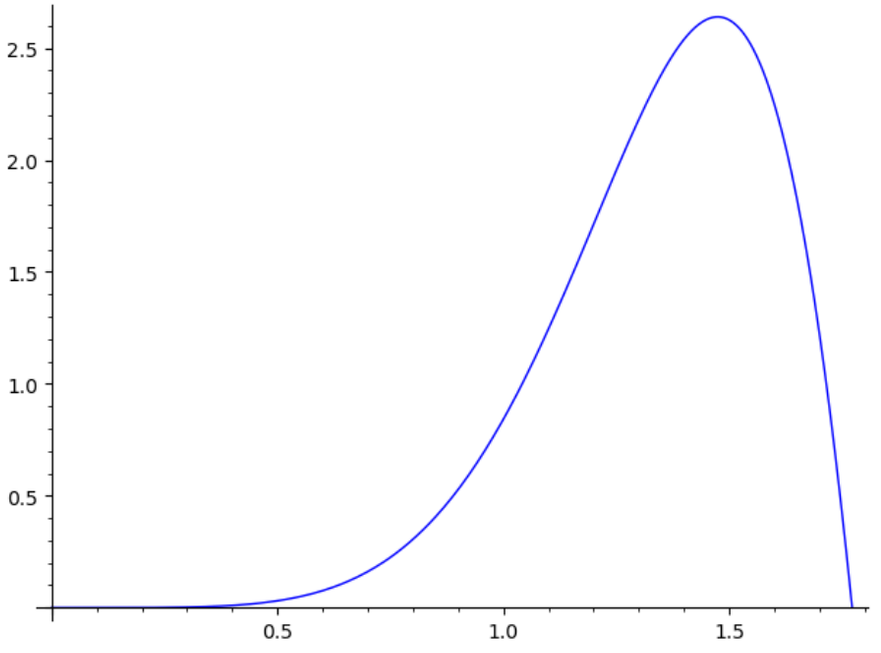
Assignment #1

The easy way and the hard way ...

Due on Friday, 25 June.

Submission: Scanned or photographed solutions are fine, so long as they are legible. Please try to make sure that they are oriented correctly – if they are sideways or upside down, they're rather harder to mark online. Submission as a single pdf is strongly preferred, but other common formats are probably OK in a pinch. Please submit your solutions via Blackboard's Assignments module. If Blackboard does not acknowledge a successful upload, please try again. As a *last* resort, email your solutions to the instructor at: `sbilaniuk@trentu.ca`

In this assignment you will attempt to compute the area of the region between the curve $y = x^3 \sin\left(x^2\right)$ for $0 \leq x \leq \sqrt{\pi}$, pictured below[1], and the x-axis.



As suggested by the title of this assignment, you will try to do this twice, with one method likely being easier than the other.

1. Find the antiderivative of $f(x) = x^3 \sin\left(x^2\right)$ and use it, along with the Fundamental Theorem of Calculus, to compute the area of the region given above. *[4]*
2. Find the area of the region given above, as accurately as you can, entirely by hand[2] and *without* using the Fundamental Theorem of Calculus in any way. *[6]*

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[1] This graph was generated by `SageMath` using the command: `plot(x^3*sin(x^2),0,sqrt(pi))`

[2] With one exception: you may use a calculator to help with your arithmetic, up to and including computing (approximate) values of $f(x) = x^3 \sin\left(x^2\right)$.