

Supplementary material to: Maharaj A, Wagh V. [S Afr J Sci. 2016;112\(11/12\), Art. #2016-0139, 6 pages.](https://doi.org/10.17159/sajs.2016/20160139)

How to cite: Maharaj A, Wagh V. Formulating tasks to develop HOTS for first-year calculus based on Brookhart abilities [supplementary material]. S Afr J Sci. 2016;112(11/12), Art. #2016-0139, 1 page. <http://dx.doi.org/10.17159/sajs.2016/20160139/suppl>

Appendix 1: Additional sample tasks

Task 8: Ability to critically evaluate a presented solution to a problem/question

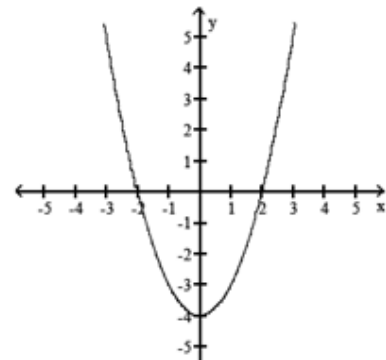
Examine critically the following question and a solution presented by a student. Indicate clearly your comments on the presented solution with justification. Also present your alternative solution to the question.

Question: Find the derivative of $x \sin x$ with respect to x

Solution: $\frac{d}{dx}(x \sin x) = \frac{d}{dx}(x) \frac{d}{dx}(\sin x) = 1 \cos x = \cos x$

Task 9: Ability to use with reasonable skill available tools for mathematical exploration

Use the graph which is a representation of the function $f'(x)$ to determine features related to the relative extrema and concavity for the original function defined by $y = f(x)$



Task 10: Ability to identify linkages between groups of concepts and interpret these linkages in the context of a model

For functions defined by equations of the form $y = f(x)$, what could be concluded from the following?

1. $f(0)$
2. $f(x) = 0$
3. the rational function defined by $y = f(x)$ has domain $(-\infty, -1) \cup (-1, 2) \cup (2, \infty)$
4. $\lim_{x \rightarrow 2^+} f(x) = \infty$
5. $\lim_{x \rightarrow \infty} f(x) = 2$
6. $f'(x)$
7. $f'(x) < 0$ on the interval $[a, b]$
8. $f''(x) < 0$ on the interval $[c, d]$
9. $f''(m) < 0$ for some value m in the domain of the function f

Task 11: Ability to identify linkages between groups of concepts and interpret these linkages in the context of a model

Use appropriate geometric figures to interpret and evaluate the following definite integral

$$\int_0^3 (4 - \sqrt{9 - x^2}) dx$$