



Quiz # 03
Math 101 Section 07 Calculus I
17 October 2024 Thursday
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Solution Key

Bilkent University

Q-1) We have the following functions:

- $f(x) = 5x^7 - 7x^5 + 11x^3 - 13x + 5$
- $g(x) = (x^5 - 2)^3 + 1$
- $h(x) = (x^2 - 4)^5 + 2 \cos \frac{\pi x}{4} + \sin \frac{\pi x}{4}$.

Find the value of $(f \circ g \circ h)'(2)$.

Grading: 10 points

Solution: Grader: `gunes.akbas@bilkent.edu.tr`

We first note that we have $h(2) = 1$, $g(1) = 0$ so we must calculate

$$(f \circ g \circ h)'(2) = f'(0) g'(1) h'(2).$$

Now the following calculations are self explanatory:

$$h'(x) = 10x(x^2 - 4)^4 - \frac{\pi}{2} \sin \frac{\pi x}{4} + \frac{\pi}{4} \cos \frac{\pi x}{4}.$$

$$h'(2) = -\frac{\pi}{2}.$$

$$g'(x) = 15x^4(x^5 - 2)^2$$

$$g'(1) = 15.$$

$$f'(x) = 35x^6 - 35x^4 + 33x^2 - 13,$$

$$f'(0) = -13.$$

We now finally have:

$$(f \circ g \circ h)'(2) = f'(0) g'(1) h'(2) = (-13)(15) \left(-\frac{\pi}{2}\right) = \frac{195}{2} \pi.$$