Solution and Rubric for Quiz 5 (Wed Oct 1)

Problem: Compute the derivative of $\dfrac{\sin(x^5)}{\cos(x^5)}$.

Solution:

Note that $\dfrac{\sin(x^5)}{\cos(x^5)} = \tan(x^5)$. To apply the chain rule we write $y = \tan(u)$ where $u = x^5$, then:

$$\frac{dy}{dx} = \frac{dy}{du}\frac{du}{dx} = (\sec^2 u)(5x^4) = \boxed{5x^4 \sec^2(x^5)}$$

It is also possible, though probably more difficult, to solve this problem using the quotient rule. The result is

$$\frac{5x^4 \cos^2(x^5) + 5x^4 \sin^2(x^5)}{\cos^2(x^5)}$$

which is seen to be equal to the previous answer by applying the identities $\sin^2 u + \cos^2 u = 1$ and $\sec u = 1/(\cos u)$.

Rubric:

- Correct answer fully supported by clear and correct work: $\boxed{2 \text{ points}}$
- If the chain rule was applied correctly, but there was a minor simplification error (e.g. correct answer followed by incorrect simplification) or a single sign error in the quotient rule, but no other mistakes: $\boxed{1 \text{ point}}$
- Otherwise: $\boxed{0 \text{ points}}$