Math 1231: Single-Variable Calculus 1
George Washington University Spring 2023
Recitation 5

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Problem 1. (a) Let $h(x) = \tan^2(x)$. Find functions f and g so that $h(x) = (f \circ g)(x)$.

(b) Compute $f'(x)$ and $g'(x)$. Use that info to compute $h'(x)$.

(c) Now let $h(x) = \tan(x^2)$. Find functions f and g so that $h(x) = (f \circ g)(x)$.

(d) Compute $f'(x)$ and $g'(x)$. Use that information to compute $h'(x)$.

Problem 2. Consider the function $\sec^2(x^2+1)$

(a) Find functions f and g so that $(f \circ g)(x) = \sec^2(x^2+1)$.

(b) Talk to the people next to you. Did they pick the same f and g that you did? Can you find a different pair of functions f and g that also work?

(c) Find functions f, g, h so that $(f \circ g \circ h)(x) = \sec^2(x^2+1)$.

(d) Compute f', g', and h'.

(e) What is $\frac{d}{dx}\sec^2(x^2+1)$?

Problem 3. Find

$$\frac{d}{dx}\frac{\sin(x^2)+\sin^2(x)}{x^2+1}$$

Problem 4. (a) Compute

$$\frac{d}{dx}\sqrt{\frac{\sqrt{x}+1}{(\cos x+1)^2}}$$

(b) Find

$$\frac{d}{dx}\tan^4(\sqrt[3]{x^5+x^3+2}+1).$$

Problem 5 (Bonus)**.** Calculate

$$\frac{d}{dx}\left(\frac{\sin^2\left(\frac{x^2+1}{\sqrt{x-1}}\right)+\sqrt{x^3-2}}{\cos(\sqrt{x^2+1}+1)-\tan(x^4+3)}\right)^{5/3}$$