

## Making the Grade (Calculus I Version)

You, as the teaching assistant, are working with a class of students taking Calculus I. Grade the sample student work below first on a 10-point scale, as if these were problems on a quiz or an exam, and then on a 3-point scale, as if these were problems on the homework. Write your scores next to the student work in the appropriate column.

1. Find the derivative of  $y = \sec^2(1 + 3x)$ .

10-pt scale

3-pt scale

Student A:

$$\begin{aligned} y &= (\sec u)^2 & u &= 1 + 3x \\ y' &= 2(\sec(1+3x))(\sec x \tan x) \cdot 3 \\ &= 6 \sec x \tan x \sec(1+3x) \end{aligned}$$

Student B:

$$\begin{aligned} y' &= 2 \cdot 3 \sec(1+3x) \tan(1+3x) \\ &= 6 \sec(1+3x) \tan(1+3x) \end{aligned}$$

Student C:

$$\begin{aligned} y &= \sec(1+3x) \cdot \sec(1+3x) \\ &\quad \sec \tan(1+3x) \cdot 3 \cdot \sec \tan(1+3x) \cdot 3 \\ &\quad \boxed{18 \sec \tan(1+3x)} \end{aligned}$$

Student D:

$$y' = \tan(1+3x) \cdot 3$$

2. Let  $f(x) = \sqrt{2x^2 - 4}$ . Find  $\lim_{x \rightarrow 2} \frac{f(x) - f(2)}{x - 2}$ .

10-pt scale

3-pt scale

Student A:

$$\lim_{x \rightarrow 2} \frac{\sqrt{2x^2 - 4} - \sqrt{2(2)^2 - 4}}{x - 2}$$

$$\lim_{x \rightarrow 2} \frac{\sqrt{2x^2 - 4} - 2}{x - 2} = \frac{\sqrt{4} - 2}{2} = \frac{2 - 2}{2} = \underline{\underline{0}}$$

Student B:

$$f(x) = \sqrt{2x^2 - 4}$$

$$f(2) = \sqrt{2(2)^2 - 4} = \sqrt{8 - 4} = 2$$

$$\lim_{x \rightarrow 2} \frac{\sqrt{2x^2 - 4} - 2}{x - 2} \cdot \frac{\sqrt{2x^2 - 4} + 2}{\sqrt{2x^2 - 4} + 2}$$

$$= \lim_{x \rightarrow 2} \frac{2x^2 - 4 - 4}{(x - 2)(\sqrt{2x^2 - 4} + 2(x - 2))}$$

$$= \lim_{x \rightarrow 2} \frac{2x^2}{(x - 2)\sqrt{2x^2 - 4} + 2x^2 - 4}$$

$$= \frac{2(2)^2}{0 + 8 - 4} = \frac{8}{4} = \underline{\underline{2}}$$

Student C:

$$\lim_{x \rightarrow 2} \frac{\sqrt{2x^2 - 4} - 2}{x - 2} \quad \frac{0}{0} \quad \lim_{x \rightarrow 2} \frac{(2x^2 - 4)^2 - 2}{x - 2}$$

$$\stackrel{L'H}{=} \lim_{x \rightarrow 2} \frac{2(2x^2 - 4) \cdot 4x}{1} = 2(8 - 4)8 = \underline{\underline{64}}$$