Quiz 2 Solutions and Comments

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Hello everyone, this is Corey's orchid. I decided to bloom so that I could see Quiz #2 and provide you with some comments. The picture above is me working on the computer while I type this document. See the chart below for the grade breakdown. Oh, and ROCK ON!

Grade breakdown, remember everything is out of 50 points:

Score	Number of people scoring that
$45 - \infty$	16
$40 - 44$	5
$35 - 39$	1
$30 - 34$	2
$-\infty - 29$	3

1. If $f(x) = \frac{4}{\sqrt{x}}$, then I wouldn't need the quotient rule to compute the derivative, although that would get me the derivative as well. If not, from a longer sequence of calculations. We have $\frac{4}{\sqrt{x}} = 4x^{-1/2}$. Some people screwed up these fractional exponents, and if you did, I *strongly* suggest that you review these basic algebraic facts from any precalculus book. In any event, using the power rule:

$$\frac{d}{dx}\left[4x^{-1/2}\right] = 4 \cdot \frac{-1}{2} x^{-1/2-1} = -2x^{-3/2}.$$

The derivative evaluated at $x = 16$ is $-2(16)^{-3/2} = \frac{-1}{32}$. The problem itself says that the line goes through the point (16,1). So the equation is:

$$y - 1 = \frac{-1}{32}(x - 16), \text{ or } y = \frac{-1}{32}x + \frac{3}{2}\,.$$

2. Most people who lost points on this screwed up the exponents in the $\frac{17}{x}$ term. If you were one of these people, pay close attention to the calculation below:

$$\frac{d}{dx}\left[3x^5 - \frac{17}{x} + \sin x\right] = \frac{d}{dx}[3x^5] - \frac{d}{dx}\left[\frac{17}{x}\right] + \frac{d}{dx}[\sin x]\,.$$

Since $\frac{17}{x} = 17x^{-1}$, we have $\frac{d}{dx}\left[\frac{17}{x}\right] = 17 \cdot (-1)x^{-2} = -17x^{-2}$ by the power rule. So the final answer would be

$$\frac{d}{dx}[3x^5] - \frac{d}{dx}\left[\frac{17}{x}\right] + \frac{d}{dx}[\sin x] = 15x^4 - (-17x^{-2}) + \cos x = 15x^4 + 17x^{-2} + \cos x\,.$$

3. For this one, some people forgot that π^2 is just a number. And so, its derivative is zero. So $\frac{d}{dx}[\cos x + \pi^2] = -\sin x$.

4. This one requires the quotient rule, where $f(x) = x$, $g(x) = 3x + 2$. So

$$\begin{aligned}\frac{d}{dx}\left[\frac{x}{3x+2}\right] &= \frac{(3x+2)\frac{d}{dx}[x] - x\frac{d}{dx}[3x+2]}{(3x+2)^2} \\ &= \frac{3x+2-3x}{(3x+2)^2} \\ &= \frac{2}{(3x+2)^2}\,.\end{aligned}$$

5. This one requires the product rule in each summand.

$$\begin{aligned}\frac{d}{dx}[\cos x \sin x + x \sin x] &= \frac{d}{dx}[\cos x \sin x] + \frac{d}{dx}[x \sin x] \\ &= [\cos x \cdot (\cos x) + \sin x(-\sin x)] + [x \cos x + \sin x] \\ &= \cos^2 x - \sin^2 x + x \cos x + \sin x\,.\end{aligned}$$

6. This one requires first the quotient rule, then the product rule. The numerator $f(x) = x \cos x$, and the denominator $g(x) = x - x^2$.

$$\begin{aligned}\frac{d}{dx}\left[\frac{x \cos x}{x - x^2}\right] &= \frac{(x-x^2)\frac{d}{dx}[x \cos x] - (x \cos x)\frac{d}{dx}[x - x^2]}{(x-x^2)^2} \\ &= \frac{(x-x^2)(\cos x + x(-\sin x)) - x \cos x(1-2x)}{(x-x^2)^2} \\ &= \frac{(x-x^2)(\cos x - x \sin x) - x \cos x(1-2x)}{(x-x^2)^2}\,.\end{aligned}$$

So, there you have it. Back to being fantastically beautiful on Corey's desk. One more thing, though, that I think you should know:

Rock on!!!!