What is this document?
On Friday February 14, you will have a chance to take a D2 skill check. This document is intended to give you an idea of what to expect.

Syllabus description of D2
I can calculate derivatives using the product and quotient rules.

Note: We have also learned to calculate derivatives using limits, but there is no reason to use a limit on any of these problems.

Explanation of terminology

- The **product rule** says $\dfrac{d}{dx}\Big(f(x)\cdot g(x)\Big) = \dfrac{df}{dx}\cdot g(x) + f(x)\cdot\dfrac{dg}{dx}$

  Be careful to avoid confusing this with the fake product rule.

- The **quotient rule** says $\dfrac{d}{dx}\left(\dfrac{f(x)}{g(x)}\right) = \dfrac{\frac{df}{dx}\cdot g(x) - f(x)\cdot\frac{dg}{dx}}{\big(g(x)\big)^2}$

  Be careful to avoid confusing this with the fake quotient rule.

Types of questions to expect

- If $H(t) = (7t^3 - 2t + 1)(1 + \sqrt{t})$, calculate the derivative $\dfrac{dH}{dt}$.
- Differentiate the function $\dfrac{5 + \frac{1}{3}x^2}{1 - x}$.
- Suppose your friend thinks that the derivative of $(x^2+1)(x^3+1)$ is $(2x)(3x^2)$. Explain what you think their reasoning is, and explain why this is not the right derivative.
- Suppose $f(t) = \dfrac{2}{t} + \dfrac{t}{2}$. What is the instantaneous rate of change of $f(t)$ at $t = 1$?