I. First rewrite the function in the form $y = ax^n$. Then find the derivative.

1. $y = \frac{5}{x^3}$

2. $y = \sqrt[3]{x^{10}}$

3. $y = \frac{1}{5x^3}$

4. $y = \frac{7}{6\sqrt[5]{x^8}}$

II. Rewrite until you have the sum of a few terms, each of the form ax^n. Then find the derivative. (**Do not** use the product or quotient rule for these.)

5. $y = \frac{x^3 - 3x^2 + 5x + 2}{x^2}$

6. $y = x^2\left(x^3 + \sqrt{x} - \frac{1}{x^9} + 15\right)$

III. Find the derivative. You *will* want the product or quotient rule. **Do not simplify** your answer.

8. $y = \left(3x^2 + 2x - 3\right)\left(5x^7 + 4x^3 - 2x + 1\right)$

9. $y = \frac{8x^4 + 17}{7x^3 + 2x - 1}$

IV. The next functions will require the **chain rule**.

10. $y = \frac{5}{\sqrt[7]{3x-5}}$ (Rewrite first!)

11. $y=\left(x^3+6\right)^{23}$

12. $y=\left(\left(x^2+1\right)^4+3\right)^6+5x+10$

V. **Abstract Functions**. We don't know who they are, but we can still find some derivatives…

13. Suppose f and g are differentiable functions which have the following values

x	$f(x)$	$g(x)$	$f'(x)$	$g'(x)$
2	5	4	7	-3
4	1	-2	9	8

a. Find $h'(2)$ if $h(x)=\sqrt{f(x)+g(x)}$

b. Find $h'(2)$ if $h(x)=f\left(g(x)\right)$

14. Suppose the functions $f(x)$ and $g(x)$ and their first derivatives have the following values at $x=1$ and $x=2$.

x	$f(x)$	$g(x)$	$f'(x)$	$g'(x)$
1	6	1	–7	1/2
2	3	–1	1/2	–4

a. Find $h'(2)$ if $h(x)=f\left(x+g(x)\right)$.

b. Find $h'(1)$ if $h(x)=\dfrac{f(x)+4g(x)}{(3x+1)^2}$.