MTH 251Z Lab
Differentiation Rules

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Prompts

1. Differentiate the following polynomial expressions. Look for a pattern and become comfortable with these derivatives as you will see them a lot!

(a) 1	(f) x^{-1}	(k) $\frac{1}{x}$	(p) $x^{\frac{1}{2}}$	(u) $\sqrt{x}$
(b) x	(g) x^{-2}	(l) $\frac{1}{x^2}$	(q) $x^{\frac{3}{2}}$	(v) $\sqrt[3]{x^2}$
(c) x^2	(h) x^{-3}	(m) $\frac{1}{x^3}$	(r) $x^{\frac{4}{3}}$	(w) $\sqrt[4]{x^3}$
(d) x^3	(i) x^{-4}	(n) $\frac{1}{x^4}$	(s) $x^{\frac{5}{3}}$	(x) $\sqrt[5]{x^4}$
(e) x^4	(j) x^{-5}	(o) $\frac{1}{x^5}$	(t) $x^{\frac{6}{5}}$	(y) $\sqrt[6]{x^5}$

2. Find $\dfrac{dy}{dx}$ if $y = 1 - 2x - \dfrac{3}{2}x^2$
3. Find $f'(x)$ if $f(x) = \sqrt{x}$
4. Find $\frac{d}{dx}(251)$
5. Find $g'(y)$ if $g(y) = 16(2y^3 - \sqrt{y} + y^{-1})$
6. Find $h'(z)$ if $h(z) = 1.5e^z - 6.2\sqrt[4]{z}$
7. Let $f(x) = e^x$.
   (a) Draw a Cartesian plane. Sketch $y = f(x)$ on your plane.
   (b) Identify the y-intercept of the graph. Sketch the line tangent to $y = f(x)$ at the y-intercept.
   (c) Find an equation of the line tangent to the graph of $y = f(x)$ at its y-intercept. Does this equation seem like it matches your sketch?
8. Find an equation of the line tangent to the graph of $y = \frac{1}{4}x^2 - 2x - 7$ at the point $(4, -11)$.