AB Calculus 3.4 Practice Worksheet Name_____

1 2 3 4 5 6 7

Find the derivatives of each of the following.

1. $y=(x+4)^{50}$

$\frac{dy}{dx} = 50(x+4)^{49}$

2. $f(x)=e^{4x}$

$f'(x) = 4e^{4x}$

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

$\frac{dy}{dx} = (3^{2x+5}\ln 3)(2)$

4. $y=2^x \cdot e^{3x}$

$\frac{dy}{dx} = 2^x \ln 2\, e^{3x} + 2^x(3)e^{3x}$

5. $f(x)=xe^{3-2x}$

$e^{3-2x} + x e^{3-2x}(-2)$

6. $y=\sqrt{3x+1} = (3x+1)^{1/2}$

$\frac{3}{2\sqrt{3x+1}}$

7. $y=\sqrt[3]{3^x+1} = (3^x+1)^{1/3}$

$y' = \frac{1}{3}(3^x+1)^{-2/3}(3^x \ln 3)$

$= \frac{3^x \ln 3}{3(3^x+1)^{2/3}}$

8. $y=\frac{2^x}{\sqrt{x}}$

$y' = \frac{(2^x \ln 2)\sqrt{x} - \frac{2^x}{2\sqrt{x}}}{x}$

$= \frac{\frac{2^x \ln 2(2x) - 2^x}{2\sqrt{x}}}{x}$

$= \frac{(2^x \ln 2)(2x) - 2^x}{2x\sqrt{x}}$

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Below is a table of values from two differentiable functions f and g. Use the table to find the value of each expression below. Show work.

x	$f(x)$	$f'(x)$	$g(x)$	$g'(x)$
1	1	5	-1	-4
2	2	1	3	-2
3	-2	-1	0	1
4	3	-3	2	4

$f(x)g(x)$

9. $(fg)'(1)$

$f'(1)g(1) + f(1)g'(1)$

$5(-1) + -4(1)$

-9

10. $h'(2)$ *if* $h(x) = g(f(x))$

$g'(f(2))\ f'(2)$

$g'(2)\ (1)$

$-2\ (1)$

-2

11. $h'(2)$ *if* $h(x) = g(2x)$

$g'(2x)\ (2)$

$g'(4)\ (2)$

$4\ (2) = 8$

12. $\left(\frac{g}{f}\right)'$ *at* $x = 2$

$\frac{g'f - gf'}{f^2}$ $\qquad \frac{-2\ (2) - 1\ (3)}{4} = \frac{-7}{4}$

13. $H'(1)$ *if* $H(x) = e^{f(x)}$

$e^{f(x)}\ f'(x)$

$e^{f(1)}\ f'(1)$

$e\ (5) = 5e$

14. $h'(4)$ *if* $h(x) = \frac{1}{g(x)}$

$\frac{-1}{(g(x))^2} \cdot g'(x)$

$\frac{-1}{2^2} \cdot 4 = -1$

15. $h'(4)$ *if* $h(x) = 2f(x) - 3$

$2f'(4)$

$2(-3) =$

-6

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

$(f(x) + g(x))^{1/2}$

$h' = \frac{1}{2}(f(x) + g(x))^{-1/2}(f'(x) + g'(x))$

$\frac{1}{2}(2+3)^{-1/2}\ (1 + -2)$

$\frac{-1}{2\sqrt{5}}$