**Logs of any base**
**AP Calculus AB**
**SHOW YOUR WORK ON YOUR OWN PAPER**

Find the derivative of each.

1. $f(x)=4^x$
2. $y=x\cdot 6^{-2x}$
3. $f(t)=t^2\cdot 2^t$
4. $f(x)=\log_2 x$
5. $g(x)=\log_3(2x-1)$

Integrate each.

6. $\int 3^x dx$
7. $\int 5^{-x} dx$
8. $\int x\left(5^{-x^2}\right)dx$
9. $\int (3-x)7^{(3-x)^2} dx$
10. $\int_{-1}^{2} 2^x dx$
11. $\int_{-2}^{2} 4^{\frac{x}{2}} dx$

Find the equation of the tangent line through the given point.

12. $y=x^{\sin x}$, $\left(\frac{\pi}{2},\frac{\pi}{2}\right)$
13. $y=\log_3 x$, $(27,3)$
14. $y=2^{-x}$, $(-1,2)$

Recall

15. $\int_1^e \frac{\ln x}{x} dx$
16. $\int \frac{x-2}{x} dx$
17. $\int_0^2 e^{2x} dx$
18. Let $f(x)=x^7+4x-5$. Find $\left(f^{-1}\right)'(-5)$
19. Find the equation of the tangent line $f(x)=e^{\cos x}$ when $x=\frac{\pi}{2}$.

ANSWERS

1. $f'(x)=(\ln 4)4^x$
2. $y'=6^{-2x}(1-2x\ln 6)$
3. $t\cdot 2^t(t\ln 2+2)$
4. $f'(x)=\frac{1}{x\ln 2}$
5. $y'=\frac{2}{\ln 3(2x-1)}$
6. $\frac{3^x}{\ln 3}+C$
7. $\frac{-5^{-x}}{\ln 5}+C$
8. $\frac{-5^{-x^2}}{\ln 25}+C$
9. $\frac{-7^{(3-x)^2}}{\ln 49}+C$
10. $\frac{7}{\ln 4}$
11. $\frac{15}{\ln 16}$
12. $y-\frac{\pi}{2}=1\left(x-\frac{\pi}{2}\right)$
13. $y-3=\frac{1}{27\ln 3}(x-3)$
14. $y-2=-2\ln 2(x+1)$
15. ½
16. $x-2\ln|x|+C$
17. $\frac{e^4-1}{2}$
18. 1/4
19. $y-1=-1\left(x-\frac{\pi}{2}\right)$