

AP Calculus

Review: Derivatives

1-6: Suppose the functions f and g and their first derivatives have the values given in the table to the

right at $x = -1$ and $x = 0$. Find the first derivative of each of the following at the given value of x .

Name _____

D2-Day 7

x	$f(x)$	$f'(x)$
0	9	-2
1	-3	$\frac{1}{5}$

1. $\sqrt{x}f(x)$, $x=1$

2. $\sqrt{f(x)}$, $x=0$

3. $f(\sqrt{x})$, $x=1$

4. $f(1-5\tan x)$, $x=0$

5. $\frac{f(x)}{2+\cos x}$, $x=0$

6. $10\sin\left(\frac{\pi x}{2}\right)f^2(x)$, $x=1$

7-15: Suppose the functions f and g and their 1st derivatives have the values given in the table to the

right at $x = -1$ and $x = 0$. Find the first derivative of each of the following at the given value of x .

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

7. $\frac{f(2x)}{x-1}$, $x=0$

8. $f^2(x)g^3(x)$, $x=0$

9. $2^{g(2x)}$, $x=0$

10. $g(f(x))$, $x=-1$

11. $f(g(x))$, $x=-1$

12. $f(g(2x-1))$, $x=0$

13. $g(x+f(x))$, $x=0$

14. $g^{-1}(x)$, $x=-3$

15. $g^{-1}(f^{-1}(x))$, $x=0$

AP Calculus
Review: Derivatives

Name _____
D2-Day 7

16-30 : Find the derivative of the function.

16. $y = e^{3x-7}$

17. $y = \sin^3 x$

18. $y = 3^{2x^4}$

19. $b = \log_5(t-7)$

20. $y = \ln(e^{x^2})$

21. $y = \ln(\sin x)$

22. $y = x^{\ln x}$

23. $y = \frac{(2x)2^x}{\sqrt{x^2+1}}$

24. $y = e^{\tan^{-1} x}$

25. $y = \sin^{-1} \sqrt{1-u^2}$

26. $y = (1+t^2) \cot^{-1} 2t$

27. $y = \tan^{-1} \left(\frac{1}{x} \right)$

28. $y = \cos(1-2t)$

29. $y = xe^{-x}$

30. $y = \log_3(\theta^2)$

AP Calculus
Review: Derivatives
31-34: Find dy/dx .

Name _____
D2-Day 7

31. $xy + 2x + 3y = 1$

32. $5x^{4/5} + 10y^{6/5} = 15$

33. $\sqrt{xy} = 1$

34. $y^2 = \frac{x}{x+1}$

35-38: Find the equation of the tangent line at the given value of x .

35. $y = \sqrt{x^2 - 2x}$, $x = 3$

36. $y = \tan 2x$, $x = \pi/3$

37. $x^2 + 2y^2 = 9$, $(1, 2)$

38. $x + \sqrt{xy} = 6$, $(4, 1)$

39. The height (in meters) of a projectile shot vertically upward from a point 10 meters above ground level with an initial velocity of 40 m/s is $h = 10 + 40t - 4.9t^2$ after t seconds.

a. Find the velocity after 2 s and after 4s.

d. When does it hit the ground?

b. When does the projectile reach its maximum height?

e. With what velocity does it hit the ground?

c. What is the maximum height?

Answers:

- | | | | | | |
|---|--|--|--|--|---------------------------------------|
| 1) $-\frac{13}{10}$ | 2) $-\frac{1}{3}$ | 3) $\frac{1}{10}$ | 4) -1 | 5) $-\frac{2}{3}$ | 6) -12 |
| 7) 5 | 8) 0 | 9) $\ln 2$ | 10) 8 | 11) 2 | 12) 4 |
| 13) -1 | 14) $\frac{1}{4}$ | 15) $\frac{1}{2}$ | 16) $3e^{3x-7}$ | 17) $3\cos x \sin^2 x$ | 18) $8x^3 \cdot 3^{2x^4} \cdot \ln 3$ |
| 19) $\frac{1}{(t-7)\ln 5}$ | 20) $2x$ | 21) $\cot x$ | 22) $\left[\frac{2\ln x}{x}\right]x^{\ln x}$ | 23) $\left[\frac{1}{x} + \ln 2 - \frac{x}{x^2+1}\right] \frac{2x \cdot 2^x}{\sqrt{x^2+1}}$ | 24) $\frac{e^{\tan^{-1}x}}{x^2+1}$ |
| 25) $\frac{-1}{\sqrt{1-u^2}}$ | 26) $\frac{-2(1+t^2)}{4t^2+1} + 2t \cot^{-1}(2t)$ | 27) $\frac{-1}{1+x^2}$ | 28) $2\sin(1-2t)$ | 29) $e^{-x}(-x+1)$ | |
| 30) $\frac{2}{\theta \ln 3}$ | 31) $\frac{-2-y}{x+3}$ | 32) $\frac{-1}{3x^{\frac{1}{5}}y^{\frac{1}{5}}}$ | 33) $\frac{-y}{x}$ | 34) $\frac{1}{2(x+1)^{\frac{3}{2}}\sqrt{x}}$ | |
| 35) $y - \sqrt{3} = \frac{2}{\sqrt{3}}(x-3)$ | 36) $y + \sqrt{3} = 8\left(x - \frac{\pi}{3}\right)$ | 37) $y - 2 = -\frac{1}{4}(x-1)$ | 38) $y - 1 = -\frac{5}{4}(x-4)$ | | |
| 39) a) $v(2) = 20.4 \frac{m}{sec}$
$v(4) = .8 \frac{m}{sec}$ | b) $t = 4.082 \text{ sec}$ | c) 91.633 meters | d) $t = 8.406 \text{ sec}$ | e) $v(8.406) = -42.379 \frac{m}{sec}$ | |