Derivatives Worksheet

AP and College Calculus

Name _____ Date _____

Warm-up

1. Find $f'(x)$: $f(x) = 9x^3$

2. Find $\dfrac{d}{dx}\sin(9x)$

3. $f'(x) = 2x - 12$. Where is $f'(x) = 0$?

4. Find $f'(x)$: $f(x) = x^3$

5. $f'(3) = -2$. At $x = 3$, f is...
   (A) Increasing (B) Decreasing (C) At a max (D) Constant

Practice

6. Find $f'(x)$: $f(x) = \sqrt{x}$

7. Find $\dfrac{d}{dx}(x+3)^6$

8. Position $s = t^2 - 6t$. When is velocity zero?

9. Find $f'(x)$: $f(x) = \dfrac{8}{x}$

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10. Find $\frac{d}{dx}(6x+1)^5$

11. f' goes from positive to negative at $x=1$. There's a...
    (A) Hole (B) Local max (C) Vertical asymptote (D) Local min

12. Find the slope of $y=x^4$ at $x=1$.

13. Find $\frac{d}{dx}e^{6x}$

Challenge

14. A rock's height is $h=-5t^2+37t$. What's its speed at $t=2$, in m/s?

15. Find $\frac{d}{dx}\frac{x}{x+9}$

16. 16 m of fence makes a rectangle. What's the largest area, in m^2?

17. Where does $y=x^2-12x$ have a horizontal tangent? Give x.

18. Find $\frac{d}{dx}\ln(x^2+6)$

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Derivatives Worksheet: Answer Key

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1. $27x^2$

   Coefficient times exponent.

2. $9\cos(9x)$

   Multiply by the inside derivative.

3. 6

   Solve for x.

4. $3x^2$

   Bring 3 down and lower the exponent.

5. (B) Decreasing

   Negative slope falls.

6. $\dfrac{1}{2\sqrt{x}}$

   Write $x^{1/2}$.

7. $6(x+3)^5$

   The inside derivative is 1.

8. 3

   $v = 2t - 6$.

9. $-\dfrac{8}{x^2}$

   Write $8x^{-1}$.

10. $30(6x+1)^4$

    Don't forget the 6.

11. (B) Local max

    Rising, then falling, is a peak.

12. 4

    $4x^3$ at $x = 1$.

13. $6e^{6x}$

    Chain rule.

14. 17

    $h' = -10t + 37$.

15. $\dfrac{9}{(x+9)^2}$

    Quotient rule.

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16. 16

    It's a square with side 4.

17. 6

    $2x - 12 = 0$.

18. $\dfrac{2x}{x^2 + 6}$

    Outside: $\dfrac{1}{\text{inside}}$. Then multiply by $2x$.

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