**Starter Quiz** ·

AP Calculus BC Name: _____ Score: _____

1. The Chain Rule gives $\dfrac{d}{dx}[f(g(x))] =$

   ☐ $f'(g(x))$

   ☐ $f'(x) \cdot g'(x)$

   ☐ $f(g'(x))$

   ☐ $f'(g(x)) \cdot g'(x)$

2. Differentiating with respect to $x$, $\dfrac{d}{dx}[y^2] =$

   ☐ $2x$

   ☐ $2y$

   ☐ $2y\dfrac{dy}{dx}$

   ☐ $2$

3. The derivative of an inverse is $\left(f^{-1}\right)'(x) =$

   ☐ $f'(x)$

   ☐ $\dfrac{1}{f'(x)}$

   ☐ $-f'(x)$

   ☐ $\dfrac{1}{f'(f^{-1}(x))}$

4. What is $\dfrac{d}{dx}[\arcsin x]$?

   ☐ $\cos x$

   ☐ $\dfrac{1}{\sqrt{1-x^2}}$

   ☐ $-\dfrac{1}{\sqrt{1-x^2}}$

   ☐ $\dfrac{1}{1+x^2}$

5. Which rule does $y = x^2 \sin x$ need at the top level?

   ☐ chain rule only

   ☐ product rule

   ☐ power rule only

6. For $f(x) = x^3 - 2x^2 + 5x$, $f'(x) = 6x - 4$. Find $f'(2)$.

   _____

7. For $y = (2x+1)^3$, find $y'$ at $x = 0$. (Chain rule: $3(2x+1)^2 \cdot 2$.)

   _____

8. For $x^2 + y^2 = 25$, $\dfrac{dy}{dx} = -\dfrac{x}{y}$. Find the slope at $(3, 4)$ (a decimal).

   _____

9. If $f(2) = 5$ and $f'(2) = 4$, find $\left(f^{-1}\right)'(5)$.

   _____

10. For $y = \arctan(3x)$, $y' = \dfrac{3}{1+9x^2}$. Find $y'$ at $x = 0$.

    _____

**Answers** ·

AP Calculus BC

1. $f'(g(x)) \cdot g'(x)$

   Outer derivative at the inner, times the inner derivative.

2. $2y\dfrac{dy}{dx}$

   Chain rule: $2y$ times the inner derivative $\frac{dy}{dx}$.

3. $\dfrac{1}{f'(f^{-1}(x))}$

   One over the original derivative at the matching input $f^{-1}(x)$.

4. $\dfrac{1}{\sqrt{1-x^2}}$

   arcsin has the root form $\frac{1}{\sqrt{1-x^2}}$.

5. **product rule**

   It is a product of $x^2$ and $\sin x \to$ product rule.

6. **8**

   $f'(2) = 6(2) - 4 = 8$.

7. **6**

   $y' = 6(2x+1)^2$; at 0: $6(1) = 6$.

8. **-0.75**

   $-\frac{3}{4} = -0.75$.

9. **0.25**

   $f^{-1}(5) = 2$, so $\left(f^{-1}\right)'(5) = \frac{1}{f'(2)} = \frac{1}{4}$.

10. **3**

    At $x = 0$: $\frac{3}{1+0} = 3$.