AP Calculus AB - Worksheet 40 **Derivatives of Inverse Trigonometric Functions**

Know the following Theorems.

$\frac{d}{dx}\left[\arcsin\square\right]=\frac{d\square}{\sqrt{1-\square^2}}$	$\frac{d}{dx}\left[\arctan\square\right]=\frac{d\square}{1+\square^2}$	$\frac{d}{dx}\left[\operatorname{arcsec}\square\right]=\frac{d\square}{\lvert\square\rvert\sqrt{\square^2-1}}$
$\frac{d}{dx}\left[\arccos\square\right]=\frac{-d\square}{\sqrt{1-\square^2}}$	$\frac{d}{dx}\left[\operatorname{arccot}\square\right]=\frac{-d\square}{1+\square^2}$	$\frac{d}{dx}\left[\operatorname{arccsc}\square\right]=\frac{-d\square}{\lvert\square\rvert\sqrt{\square^2-1}}$

Find the derivative of *y* with respect to the appropriate variable.

1. $y=\arccos\left(x^2\right)$ **2.** $y=\arcsin\sqrt{2t}$ **3.** $y=\arcsin\frac{3}{t^2}$

4*. $y=x\arcsin x+\sqrt{1-x^2}$ **5.** $y=\operatorname{arcsec}5s$ **6.** $y=\arctan\sqrt{t-1}$

7. Which of the following is $\frac{d}{dx}\arcsin\left(\frac{x}{2}\right)$?

A) $-\frac{2}{\sqrt{4-x^2}}$ B) $-\frac{1}{\sqrt{4-x^2}}$ C) $\frac{2}{4+x^2}$ D) $\frac{2}{\sqrt{4-x^2}}$ E) $\frac{1}{\sqrt{4-x^2}}$

Find the derivative of the function.

8. $y=3-7x^3+3x^7$ **9.** $y=\frac{2x+1}{2x-1}$ **10.** $y=\cot\left(\frac{2}{t}\right)$

11. $y=x\sqrt{2x+1}$ **12.** $r=\tan^2\left(3-\theta^2\right)$ **13.** $y=\ln\sqrt{x}$

14. $y=xe^{-x}$ **15.** $y=\ln\left(\sin x\right)$

Answers

1. $y'=-\frac{2x}{\sqrt{1-x^4}}$ **2.** $y'=\frac{1}{\sqrt{2t}\sqrt{1-2t}}$ **3.** $y'=-\frac{6}{t\sqrt{t^4-9}}$ **4.** $y'=\sin^{-1}x$

5. $y'=\frac{1}{\lvert s\rvert\sqrt{25s^2-1}}$ **6.** $y'=\frac{1}{2t\sqrt{t-1}}$ **7. E** **8.** $y'=-21x^2+21x^6$

9. $y'=-\frac{4}{\left(2x-1\right)^2}$ **10.** $y'=\frac{2\csc^2\left(\frac{2}{t}\right)}{t^2}$ **11.** $y'=\frac{3x+1}{\sqrt{2x+1}}$ **12.** $y'=-4\theta\tan\left(3-\theta^2\right)\sec^2\left(3-\theta^2\right)$

13. $y'=\frac{1}{2x}$ **14.** $y'=-e^{-x}\left(x-1\right)$ **15.** $y'=\cot x$