

INVERSE FUNCTION COMPOSITIONS

Section 4.7A

Precalculus BC PreAP/Dual, Revised ©2017

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REVIEW EXAMPLE 1

Solve $f(g(2))$ if $f(x) = 2x + 6$ and $g(x) = \left(\frac{1}{2}\right)x + 3$ through a composition.

$$f(g(2))$$

$$f\left(\frac{1}{2}x + 3\right)$$

$$f\left(\frac{1}{2}(2) + 3\right)$$

$$f(1 + 3)$$

$$f(4)$$

$$2x + 6$$

$$2(4) + 6$$

$$f(g(2)) = 14$$

STEPS

- A. Evaluating this expression is to find the value of the inside parentheses**
- B. Solve using the restrictions, if necessary**
- C. Evaluate the outside with the restrictions, if necessary**

REVIEW

Without a calculator, find the exact value of $\sin\left(\frac{\pi}{2}\right)$

$$\sin\left(\frac{\pi}{2}\right) = 1$$

EXAMPLE 1

Without a calculator, find the exact value of $\sin(\sin^{-1}(1))$

$$\sin^{-1}\left(\frac{\pi}{2}\right) = \mathbf{1}$$

$$\sin\left(\frac{\pi}{2}\right)$$

1

EXAMPLE 2

Without a calculator, find the exact value of $\sin\left(\cos^{-1}\left(\frac{\sqrt{3}}{2}\right)\right)$

$$\frac{1}{2}$$

YOUR TURN

Without a calculator, find the exact value of $\cos\left(\tan^{-1}(1)\right)$

$$\frac{\sqrt{2}}{2}$$

EXAMPLE 3

Without a calculator, find the exact value of $\text{Sin}^{-1} \left(\sin \left(\frac{5\pi}{4} \right) \right)$

$$\text{Sin}^{-1} \left(-\frac{\sqrt{2}}{2} \right)$$
$$\sin^{-1} \left(-\frac{\pi}{4} \right) = \left(-\frac{\sqrt{2}}{2} \right)$$

$$-\frac{\pi}{4}$$

EXAMPLE 4

Without a calculator, find the exact value of $\text{Cos}^{-1} \left(\cos \left(\frac{\pi}{3} \right) \right)$

$$\frac{\pi}{3}$$

EXAMPLE 5

Without a calculator, find the exact value of $\text{Cos} \left(\text{Cos}^{-1}(2) \right)$

DNE

EXAMPLE 6

Without a calculator, find the exact value of $\arccos(\tan(2\pi))$

$$\frac{\pi}{2}$$

YOUR TURN

Without a calculator, find the exact value of $\arccos\left(\sin\left(\frac{5\pi}{4}\right)\right)$

$$\frac{3\pi}{4}$$

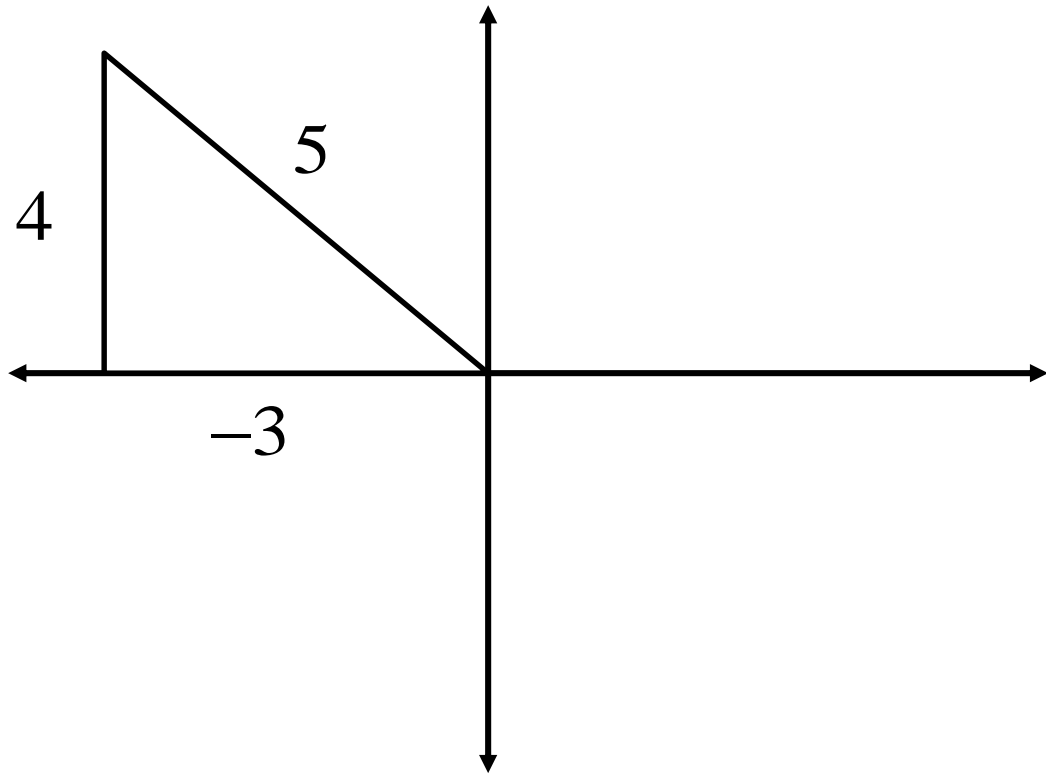
EXAMPLE 7

Without a calculator, find the exact value of $\sec(\arctan(\sqrt{3}))$



EXAMPLE 8

Without a calculator, find the exact value of $\sin \left(\cos^{-1} \left(-\frac{3}{5} \right) \right)$



$$x^2 + y^2 = r^2$$

$$(-3)^2 + y^2 = (5)^2$$

$$9 + y^2 = 25$$

$$y^2 = 16$$

$$y = 4$$

$$\sin \left(\cos^{-1} \left(-\frac{3}{5} \right) \right)$$

$$\sin = \frac{y}{r}$$

$$\frac{4}{5}$$

EXAMPLE 9

Without a calculator, find the exact value of $\cos\left(\tan^{-1}\left(-\frac{\sqrt{5}}{2}\right)\right)$



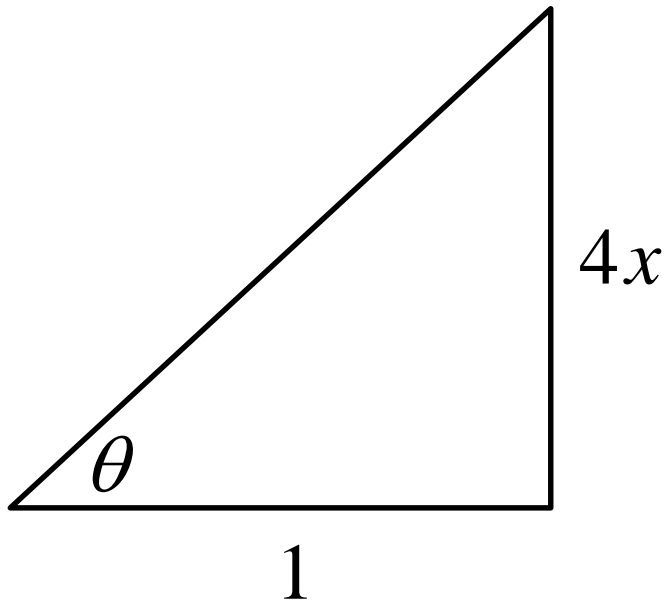
YOUR TURN

Without a calculator, find the exact value of $\tan\left(\sin^{-1}\left(\frac{1}{3}\right)\right)$

$$\frac{\sqrt{2}}{4}$$

EXAMPLE 10

Without a calculator, find the exact value of $\sec(\tan^{-1}(4x))$.



$$\arctan 4x = \theta$$

$$\tan \theta = 4x$$

$$\sec \theta = \frac{r}{x}$$

$$(1)^2 + (4x)^2 = r^2$$

$$\sqrt{16x^2 + 1}$$

EXAMPLE 11

Without a calculator, solve $\cot(\text{Cos}^{-1}(3x))$.

$$\frac{3x}{\sqrt{1-9x^2}}$$

YOUR TURN

Without a calculator, solve $\sin(\cos^{-1}(3x))$.

$$\sqrt{1-9x^2}$$

ASSIGNMENT

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