Accelerated Precalculus Name: ____________________

4.18 Review Worksheet: Trig Inverses & Principal Values Date:

Find the exact value for each expression. Use radian measures for angles. Use principal values for inverses.

1. $Arctan\,(-1)$ $= \boxed{-\pi/4}$

$\tan\theta = -1$

2. $Cos^{-1}(-2)$ $\boxed{\text{undefined}}$

$\cos\theta = -2$

3. $Arcsin\,(1)$ $= \boxed{\pi/2}$

$\sin\theta = 1$

4. $Tan^{-1}\left(\frac{\sqrt{3}}{3}\right)$ $= \boxed{\pi/6}$

$\tan\theta = \frac{\sqrt{3}}{3}$

5. $Arccos\,(1)$ $= \boxed{0}$

$\cos\theta = 1$

6. $Sin^{-1}\left(-\frac{\sqrt{3}}{2}\right)$ $= \boxed{-\frac{\pi}{3}}$

$\sin\theta = \frac{-\sqrt{3}}{2}$

7. $Arcsin\left[\sin\left(\frac{3\pi}{4}\right)\right]$

$Arcsin\left[\frac{\sqrt{2}}{2}\right] = \boxed{\frac{\pi}{4}}$

8. $\cos\left[Tan^{-1}(-\sqrt{3})\right]$

$\tan\theta = \frac{-\sqrt{3}}{1}$

$\cos\left(-\frac{\pi}{3}\right) = \boxed{\frac{1}{2}}$

9. $Arccos\left[cos\left(\frac{7\pi}{4}\right)\right]$ $= \boxed{\pi/4}$

$\cos\theta = \frac{\sqrt{2}}{2}$

10. $Sin^{-1}\left[\tan\left(\frac{5\pi}{4}\right)\right]$ $\rightarrow \boxed{\pi/2}$

$Sin^{-1}(1)$

$\sin\theta = 1$

11. $\tan\left[2\,Sin^{-1}\left(\frac{\sqrt{3}}{2}\right)\right]$ $= \boxed{-\sqrt{3}}$

$\sin\theta = \frac{\sqrt{3}}{2}$

$2\left(\frac{\pi}{3}\right)$

$\tan\left(\frac{2\pi}{3}\right) = \frac{-\sqrt{3}}{1} = \boxed{-\sqrt{3}}$

12. $\csc[Arctan\,(1)]$ $= \boxed{\sqrt{2}}$

$\tan\theta = 1$

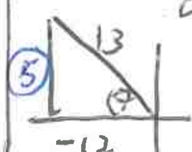
$\csc\left(\pi/4\right) = \frac{2}{\sqrt{2}} = \boxed{\sqrt{2}}$

13. $\tan\left[Sin^{-1}\left(\frac{3}{8}\right)\right]$ $\rightarrow \boxed{\frac{3}{\sqrt{55}}}$

$\sin\theta = \frac{3}{8}$

14. $\cot\left[Arccos\left(-\frac{12}{13}\right)\right]$ $\rightarrow \boxed{\frac{-12}{5}}$

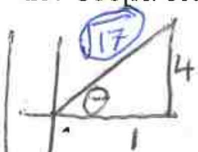
$\cos\theta = \frac{-12}{13}$



$a^2 + (-12)^2 = 13^2$

15. $\sec[Arctan\,(4)]$ $\rightarrow \frac{\sqrt{17}}{1} = \boxed{\sqrt{17}}$

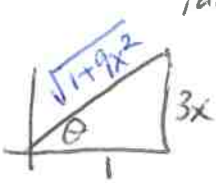
$\tan\theta = \frac{4}{1}$



$1^2 + 4^2 = c^2$ $c = \sqrt{17}$

16. $Cos[Arctan(3x)]$ $\rightarrow \boxed{\frac{1}{\sqrt{1+9x^2}}}$

$\tan\theta = \frac{3x}{1}$



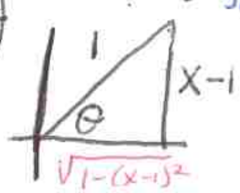
$1^2 + (3x)^2 = c^2$

$1 + 9x^2 = c^2$

$c = \sqrt{1+9x^2}$

17. $\tan[Sin^{-1}(x-1)]$

$\sin\theta = \frac{x-1}{1}$



$\boxed{\tan\theta = \frac{x-1}{\sqrt{1-(x-1)^2}}}$

$a^2 + (x-1)^2 = 1^2$

$a^2 = 1 - (x-1)^2$

$a = \sqrt{1-(x-1)^2}$

18. $\csc\left[Cos^{-1}\left(\frac{x}{\sqrt{7}}\right)\right]$ $\rightarrow \boxed{\frac{\sqrt{7}}{\sqrt{7-x^2}}}$

$\cos\theta = \frac{x}{\sqrt{7}}$

$x^2 + b^2 = \sqrt{7}^2$

$b^2 = 7 - x^2$

$b = \sqrt{7-x^2}$

19. Amy's family went to an amusement park while they are at the beach. She decides to ride the Ferris wheel so she can look out at the ocean. She was disappointed to find out that a 100 foot building blocked her view for part of the ride. Amy's height in feet above the ground as she travels around the Ferris wheel can be modeled using the following equation where t = time in minutes from the beginning of Amy's ride: $h(t) = -60\cos\left(\frac{2\pi}{3}t\right) + 70$.

a) How long it will take until Amy can see over the building?

$100 = -60\cos\left(\frac{2\pi}{3}t\right) + 70$

$\frac{30}{-60} = \frac{-60\cos\left(\frac{2\pi}{3}t\right)}{-60}$

$\frac{-1}{2} = \cos\left(\frac{2\pi}{3}t\right)$

$\frac{2\pi}{3}t = \cos^{-1}\left(\frac{-1}{2}\right)$

$\frac{2\pi}{3}t = \frac{2\pi}{3}$

$\boxed{t = 1 \text{ min.}}$

b) How long will it take Amy to reach the top of the ride?

$130 = -60\cos\left(\frac{2\pi}{3}t\right) + 70$

$\frac{60}{-60} = \frac{-60\cos\left(\frac{2\pi}{3}t\right)}{-60}$

$\cos\left(\frac{2\pi}{3}t\right) = -1$

$\frac{2\pi}{3}t = \cos^{-1}(-1)$

$\frac{2\pi}{3}t = \pi$

$t = \pi \cdot \frac{3}{2\pi} = \frac{3}{2} = \boxed{1.5 \text{ min.}}$

c) How long into Amy's ride will the building again obstruct her view of the ocean?

$\frac{2\pi}{3}t = \cos^{-1}\left(\frac{-1}{2}\right)$

$\frac{2\pi}{3}t = \frac{4\pi}{3}$

$t = \frac{4\pi}{3} \cdot \frac{3}{2\pi} = 2$

$\boxed{t = 2 \text{ min.}}$

20. The area of an isosceles triangle can be found using the formula $Area = \frac{1}{2}x^2 \sin\theta$, where x is the length of the legs and θ is the vertex angle. If an isosceles triangle has a leg length of 4, then what measures for the vertex angle will produce an area of 4?

$Area = \frac{1}{2}x^2 \sin\theta$ $\quad x = 4$

$4 = \frac{1}{2}(4)^2 \sin\theta$

$4 = \frac{16}{2}\sin\theta$

$4 = 8\sin\theta$

$\frac{4}{8} = \sin\theta$

$\sin\theta = \frac{1}{2}$

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

$\boxed{\theta = \frac{\pi}{6}}$