

1. Given that $\cos(x) = \frac{1}{5}$ find the following. (Assume $0 \leq x \leq \frac{\pi}{2}$.) (5 pts)

$$\sin^2 x + \cos^2(x) = 1 \Rightarrow \sin^2(x) = 1 - \left(\frac{1}{5}\right)^2 = \frac{24}{25}$$

$$\sin(x) = \pm \frac{2\sqrt{6}}{5}$$

$$\sin(x) = \frac{2\sqrt{6}}{5}$$

$$\tan(x) = \frac{2\sqrt{6}}{1}$$

$$= \frac{2\sqrt{6}}{1} = 2\sqrt{6}$$

$$\sec(x) = 5$$

$$\csc\left(\frac{\pi}{2} - x\right) = 5 \leftarrow \text{cofunctions of complementary angles}$$

2. Use trigonometric identities to transform the left side of the equation into the right side. (Assume $0 \leq x \leq \frac{\pi}{2}$.) Show all steps! (3pts)

$$\tan(x) \csc(x) = \sec(x)$$

$$\tan(x) \csc(x) = \frac{\sin(x)}{\cos(x)} \cdot \frac{1}{\sin(x)} = \frac{1}{\cos(x)} = \sec(x)$$

3. Evaluate using any technique. (2pts)

$$\sin\left(\frac{7\pi}{4}\right) = \sin\left(\frac{15\pi}{4}\right) = -\frac{\sqrt{2}}{2}$$



Bonus: If the number of lily pads in a pond is doubling every day, and the pond is entirely covered with lily pads after 28 days, how long did it take the pond to be half covered? (1 pt)

27 days.