

Homework for March 4, 2018.

Algebra.

- * If 9 dice are rolled, what is the probability that all 6 numbers appear?
- * How many permutations of the 26 letters of English alphabet do not contain any of the words *pin*, *fork*, or *rope*?

Trigonometry.

Read the classwork handout. Complete the unsolved problems from the previous homework. Additional reading on trigonometric functions is Gelfand & Saul, Trigonometry, Chapter 2 (pp. 42-54) and Chapters 6-8 (pp. 123-163), http://en.wikipedia.org/wiki/Trigonometric_functions <http://en.wikipedia.org/wiki/Sine>. Solve the following problems.

- Simplify the following expressions:

- $$\frac{\sin(\pi+\alpha) \cos(\pi-\alpha)}{\sin(\alpha-\pi) \cos(\alpha+\pi)}$$
- $$\frac{\cot^2\left(\alpha+\frac{\pi}{2}\right) \cos^2\left(\alpha-\frac{\pi}{2}\right)}{\cot^2\left(\alpha-\frac{\pi}{2}\right) - \cos^2\left(\alpha+\frac{\pi}{2}\right)}$$
- $$\frac{\cot\left(\frac{3\pi}{2}-\alpha\right)}{1-\tan^2(\alpha-\pi)} \cdot \frac{\cot^2(2\pi-\alpha)-1}{\cot(\alpha+\pi)}$$
- $$\frac{\cos^2\left(\alpha-\frac{3\pi}{2}\right)}{\sin^{-2}\left(\alpha+\frac{\pi}{2}\right)-1} \cdot \frac{\sin^2\left(\alpha+\frac{3\pi}{2}\right)}{\cos^{-2}\left(\alpha-\frac{\pi}{2}\right)-1}$$
- $$\frac{\left(1+\tan^2\left(\alpha-\frac{\pi}{2}\right)\right)\left(\sin^{-2}\left(\alpha-\frac{3\pi}{2}\right)-1\right)}{\left(1+\cot^2\left(\alpha+\frac{3\pi}{2}\right)\right) \cos^{-2}\left(\alpha+\frac{\pi}{2}\right)}$$
- $$\frac{\sin^2\left(\alpha+\frac{\pi}{2}\right) - \cos^2\left(\alpha-\frac{\pi}{2}\right)}{\tan^2\left(\alpha+\frac{\pi}{2}\right) - \cot^2\left(\alpha-\frac{\pi}{2}\right)}$$

- Solve the following equations (find all solutions):

- $\sin x = \frac{1}{2}$

- $\tan x = 1$

- $\cos x = \frac{\sqrt{3}}{2}$

- $\cos^2 x = \frac{1}{2}$