

These problems represent a review of the content that will be covered by the third exam. The answers are available as a pdf at <http://alex.knaust.info/pltlfall12011/>

1. Verify the following trigonometric identities. **Make sure to practice writing these very formally, and mention which identity is used in each step (if any).**

(a) $\cos x(\tan^2 x + 1) = \sec x$

(b) $\sin^5 x \cos^2 x = (\cos^2 x - 2 \cos^4 x + \cos^6 x) \sin x$

(c) $\tan\left(\frac{\pi}{4} - \theta\right) = \frac{1 - \tan \theta}{1 + \tan \theta}$

(d) $1 + \cos 10y = 2 \cos^2 5y$

(e) $\frac{\cos 3\beta}{\cos \beta} = 1 - 4 \sin^2 \beta$

(f) $\frac{\tan x + \tan y}{1 - \tan x \tan y} = \frac{\cot x + \cot y}{\cot x \cot y - 1}$

2. Solve the following equations (all solutions)

(a) $\sin^2 x = 3 \cos^2 x$

(b) $\cos x + \sin x \tan x = 2$

(c) $\tan(x + \pi) + 2 \sin(x + \pi) = 0$

(d) $\cos 2x + \sin x = 0$

(e) $\sin\left(x + \frac{\pi}{2}\right) - \cos^2 x = 0$

3. Find the following exact values

(a) $\arcsin\left(\sin\left(\frac{5}{7}\right)\right)$

(b) $\arccos\left(\sin\left(\frac{\pi}{3}\right)\right)$

(c) $\tan\left(\arcsin\left(\frac{3}{5}\right)\right)$

4. Find the amplitude, phase shift, and period etc. and graph the following equations

(a) $f(x) = -2 \cos\left(x + \frac{\pi}{4}\right)$

(b) $g(x) = \sin\left(\frac{x}{3} - \pi\right) + 1$

5. A triangular parcel of land has sides of lengths 5m, 7m and 9m. Find the measure of the largest angle (in the triangle)
6. Two ships leave a port at 9 a.m. one travels at an angle of 53° at 12 miles per hour and the other travels at an angle of 67° at 16 miles per hour. Approximate how far apart they are from each other at noon.