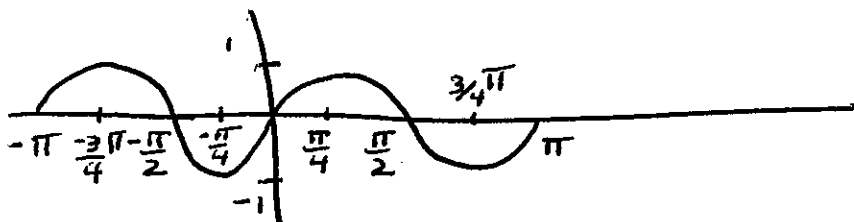


Math 124 Practice Final
§4.1, 4.2, 4.3, 4.4, 5.2, 6.1, 6.2, 6.3, 7.1, 7.3, 7.4
Spring 2010

§4.1, 4.2 Sketch the graph.

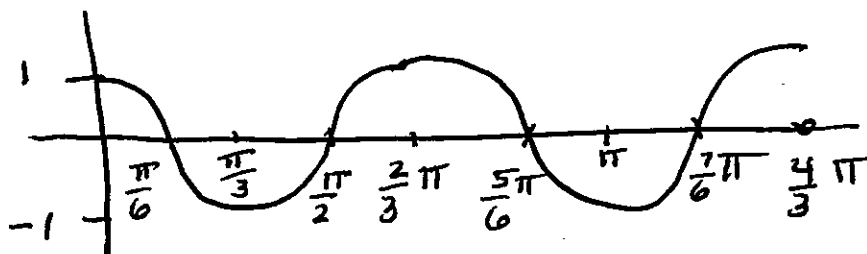
1. $y = \sin 2x$

$$P = \frac{2\pi}{2} = \pi$$



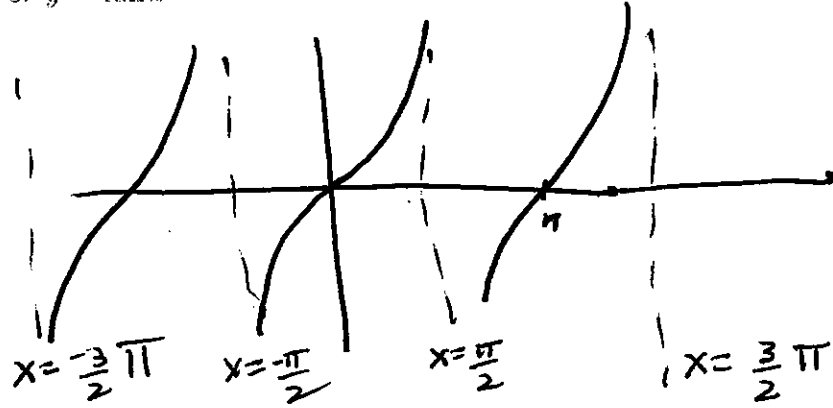
2. $y = \cos 3x$

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

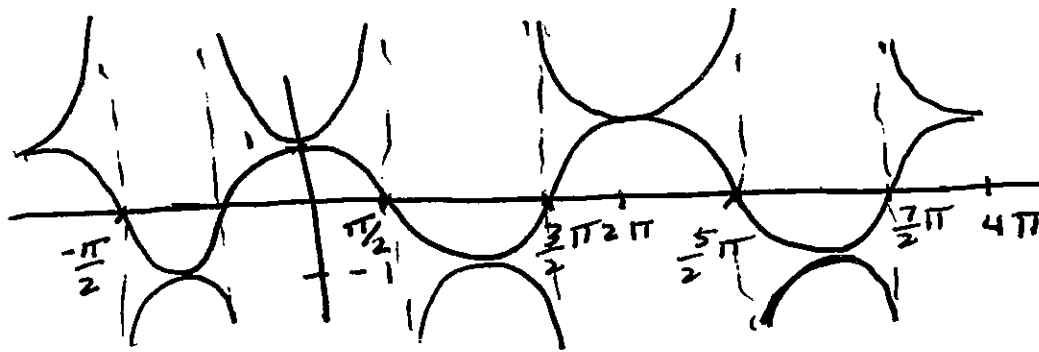


§4.3, 4.4 Sketch the graph.

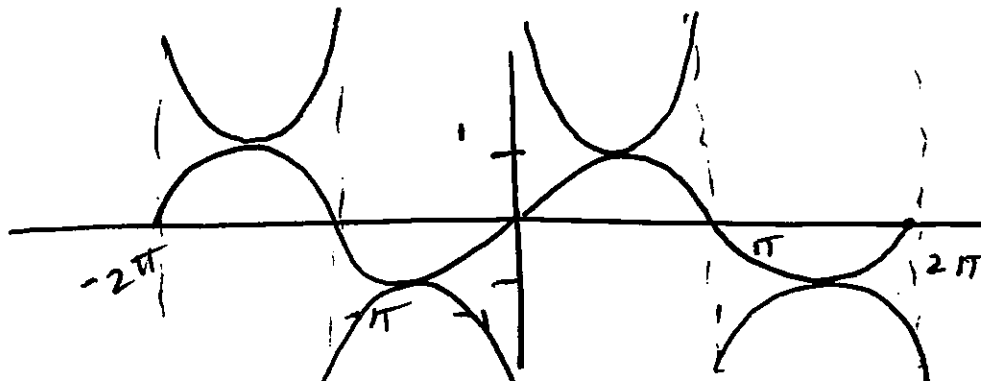
3. $y = \tan x$



4. $y = \sec x$



5. $y = \csc x$



§5.2 Verify that the trigonometric equation is an identity.

$$\sin^4 \theta - \cos^4 \theta = 2 \sin^2 \theta - 1$$

LHS

$$(\sin^2 \theta - \cos^2 \theta) \underbrace{(\sin^2 \theta + \cos^2 \theta)}_1$$

$$= \sin^2 \theta - \cos^2 \theta$$

$$= \sin^2 \theta - (1 - \sin^2 \theta)$$

$$= \sin^2 \theta - 1 + \sin^2 \theta$$

$$= 2 \sin^2 \theta - 1$$

§6.1 Give exact values in radians.

$$6. \sin^{-1}(1/2) = \frac{\pi}{6}$$

$$7. \cos^{-1}(-\sqrt{3}/2) = \frac{5\pi}{6}$$

$$8. \tan^{-1} 0 = 0$$

$$9. \sin^{-1}(-\sqrt{2}/2) = \frac{3\pi}{4}$$

§6.1, 6.2 Find all of the solutions on the interval $[0, 2\pi)$. Give exact values in radians.

10. $\sin x = \sqrt{3}/2$

$$x = \frac{\pi}{3}, x = \frac{2\pi}{3}$$

11. $\cos x = -\sqrt{2}/2$

$$x = \frac{3\pi}{4}, x = \frac{5\pi}{4}$$

§6.1, 6.2 Find all real solutions. Give exact values in radians.

12. $\sin 2x = -1/2$

$$2x = \frac{7}{6}\pi + 2k\pi, \quad 2x = \frac{11}{6}\pi + 2k\pi$$

$$x = \frac{7}{12}\pi + k\pi, \quad x = \frac{11}{12}\pi + k\pi$$

13. $\cos 3x = \sqrt{2}/2$

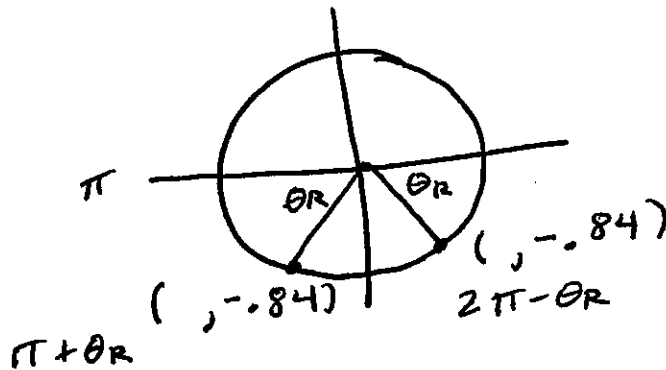
$$3x = \frac{\pi}{4} + 2k\pi,$$

$$3x = \frac{7}{4}\pi + 2k\pi$$

$$x = \frac{\pi}{12} + \frac{2}{3}k\pi, \quad x = \frac{7}{12}\pi + \frac{2}{3}k\pi$$

14. §6.1, 6.2 Find all of the solutions on the interval $[0, 2\pi)$. Give an approximation to 2 decimal places.

$$\sin x = -.84$$



$$\theta_R = \sin^{-1}(.84)$$

$$\{ \pi + \theta_R, 2\pi - \theta_R \}$$

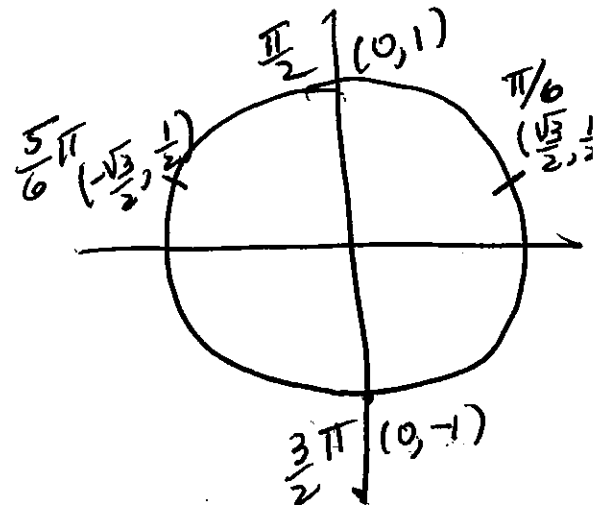
Approx.

$$\{ 4.14, 5.29 \}$$

15. Find all solutions on the interval $[0, 2\pi)$. Give exact values in radians.

$$\sin 2x = \cos x$$

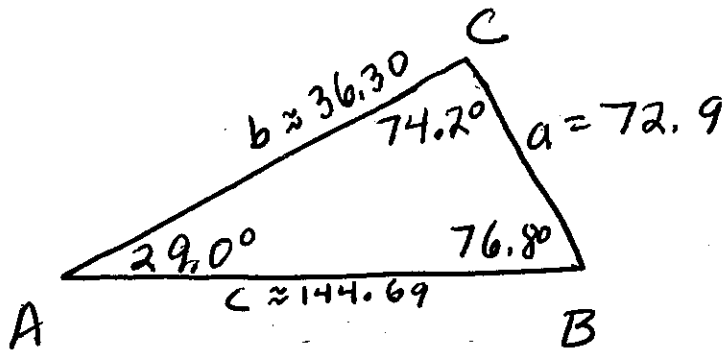
$$\begin{aligned} \sin 2x &= \cos x \\ 2 \sin x \cos x &= \cos x \\ 2 \sin x \cos x - \cos x &= 0 \\ \cos x (2 \sin x - 1) &= 0 \\ \cos x = 0, \quad 2 \sin x - 1 &= 0 \\ 2 \sin x &= 1 \\ \sin x &= \frac{1}{2} \end{aligned}$$



$$\{ \frac{\pi}{6}, \frac{\pi}{2}, \frac{5\pi}{6}, \frac{3\pi}{2} \}$$

16. §7.1 Solve the triangle using the Law of Sines. Round your answer to two decimal places.

$$A = 29.0^\circ, B = 76.8^\circ, a = 72.9\text{ft}$$



Solve for C

$$C = 180^\circ - 29.0^\circ - 76.8^\circ$$

$$C = 74.2^\circ$$

Solve for c

$$\frac{c}{\sin C} = \frac{a}{\sin A}$$

$$c = \frac{a}{\sin A} \cdot \sin C$$

$$c = \frac{72.9}{\sin(29.0^\circ)} \cdot \sin(74.2^\circ)$$

$$c \approx 102.31$$

$$c \approx 144.69$$

Solve for b

$$\frac{b}{\sin B} = \frac{a}{\sin A}$$

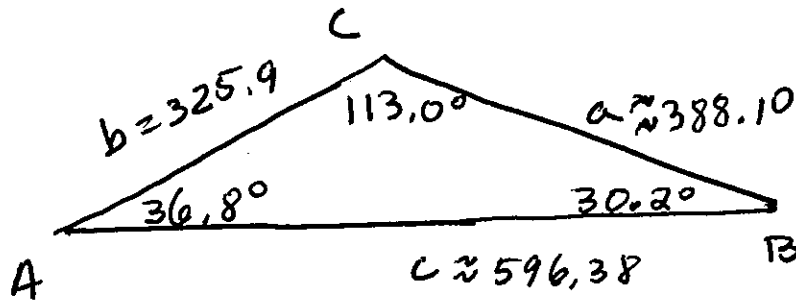
$$\frac{b}{\sin 76.8^\circ} = \frac{72.9}{\sin 29.0^\circ}$$

$$b = \frac{72.9}{\sin 76.8^\circ} \cdot \sin 29.0^\circ$$

$$b \approx 36.30$$

17. §7.1 Solve the triangle using the Law of Sines. Round your answer to two decimal places.

$$C = 113.0^\circ, A = 36.8^\circ, b = 325.9\text{ft}$$



Solve for $\angle B$

$$\begin{aligned}\angle B &= 180^\circ - 36.8^\circ - 113.0^\circ \\ &= 30.2^\circ\end{aligned}$$

Solve for c

$$\frac{c}{\sin C} = \frac{b}{\sin B}$$

$$c = \frac{b}{\sin B} \cdot \sin C$$

$$c = \frac{325.9}{\sin 30.2} \cdot \sin 113.0$$

$$c \approx 596.38$$

Solve for a

$$\frac{a}{\sin A} = \frac{b}{\sin B}$$

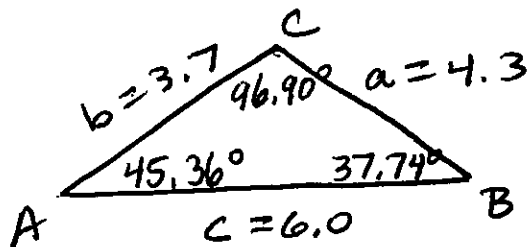
$$a = \frac{b}{\sin B} \sin A$$

$$a = \frac{325.9}{\sin 30.2} \sin 36.8$$

$$a \approx 388.10$$

18. §7.3 Solve the triangle using the Law of Cosines. Round your answer to two decimal places.

$$a = 4.3, b = 3.7, c = 6.0$$



Find mLC

$$c^2 = a^2 + b^2 - 2ab \cos C$$

$$(6.0)^2 = (4.3)^2 + (3.7)^2 - 2(4.3)(3.7) \cos C$$

$$-2(4.3)(3.7) \cos C = \frac{(6.0)^2 - (4.3)^2 - (3.7)^2}{-2(4.3)(3.7)}$$

$$\cos C = \frac{(6.0)^2 - (4.3)^2 - (3.7)^2}{-2(4.3)(3.7)}$$

$$C = \cos^{-1} \left(\frac{(6.0)^2 - (4.3)^2 - (3.7)^2}{-2(4.3)(3.7)} \right) \approx 96.90^\circ$$

Find mLA

$$\frac{\sin A}{a} = \frac{\sin C}{c}$$

$$\sin A = \frac{a \sin C}{c}$$

$$\sin A = \frac{4.3 \sin(96.90^\circ)}{6.0}$$

$$LA = \sin^{-1} \left(\frac{4.3 \sin(96.90^\circ)}{6.0} \right)$$

$$LA \approx 45.36^\circ$$

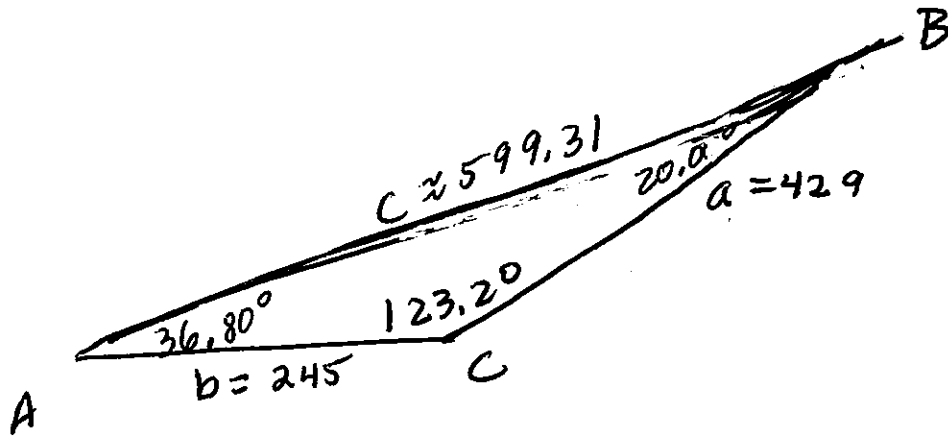
Find LB

$$LB = 180^\circ - 96.90^\circ - 45.36^\circ$$

$$LB \approx 37.74^\circ$$

19. §7.3 Solve the triangle using the Law of Cosines. Round your answer to two decimal places.

$$b = 245, C = 123.2^\circ, a = 429$$



Find C

$$c^2 = a^2 + b^2 - 2ab \cos C$$

$$c^2 = (429)^2 + (245)^2 - 2(429)(245) \cos(123.20)$$

$$c = \sqrt{(429)^2 + (245)^2 - 2(429)(245) \cos(123.2^\circ)}$$

$$c \approx 599.31$$

Find LA

$$\frac{\sin A}{a} = \frac{\sin C}{c}$$

$$\sin A = \frac{a \sin C}{c}$$

$$\sin A = \frac{429 \sin 123.2^\circ}{599.31}$$

$$A = \sin^{-1}\left(\frac{429 \sin 123.2^\circ}{599.31}\right)$$

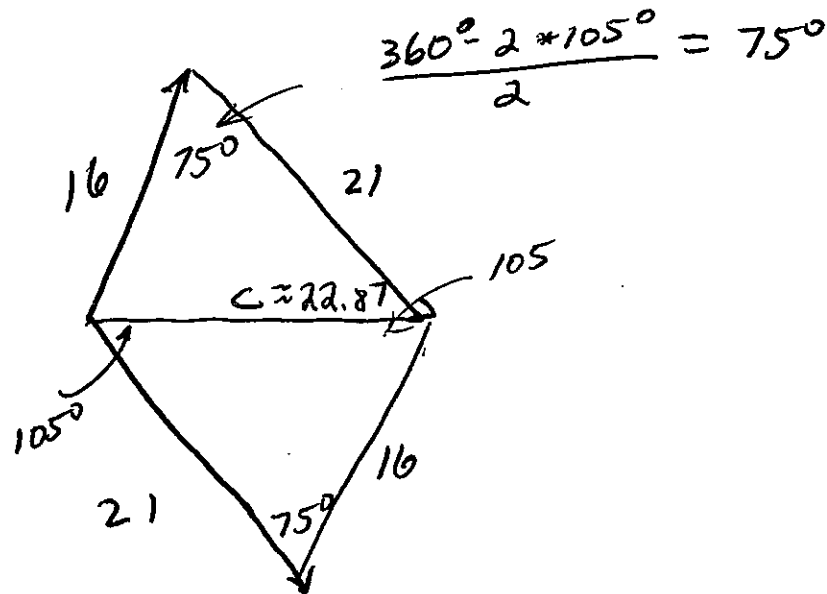
$$A \approx 36.80^\circ$$

Find LB

$$\angle B = 180^\circ - 36.8^\circ - 123.2^\circ$$

$$\angle B = 20^\circ$$

20. §7.3 Finding the Magnitude of a Resultant. Two forces of 16 and 21 newtons act on a point in the plane. (A newton is a unit of force that equals 0.225 lb.) If the angle between the forces is 105° , find the magnitude of the resultant force.



Find c

$$c^2 = a^2 + b^2 - 2ab \cos C$$

$$c^2 = (16)^2 + (21)^2 - 2(16)(21) \cos 75^\circ$$

$$c = \sqrt{(16)^2 + (21)^2 - 2(16)(21) \cos 75^\circ}$$

$$c \approx 22.87$$

22.87 newtons