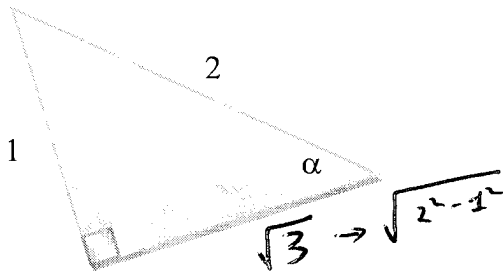


1) (8 points) For the right triangle below, find the exact value of the six trigonometric functions for the angle α . Simplify as needed:



$$\sin \alpha = \frac{1}{2} \quad \csc \alpha = 2$$

$$\cos \alpha = \frac{\sqrt{3}}{2} \quad \sec \alpha = \frac{2}{\sqrt{3}} = \frac{2\sqrt{3}}{3}$$

$$\tan \alpha = \frac{1}{\sqrt{3}} = \frac{\sqrt{3}}{3} \quad \cot \alpha = \sqrt{3}$$

2) (2 points) What is the measurement of the angle α from number 1? 30°

3) (1 point each) Fill in the blank:

a) The sine function is the Buck to cosine but the Lucky of cosecant.

b) The cosine function is the Rosie to sine but the Dotty of secant.

c) The tangent function is the Alfonso and the Cube of cotangent.

4) (1 point) If $\sin p = 0.7883$ where p is acute, then the value of $\cos(90^\circ - p)$ is 0.7883.

5) (3 points each) Given that $\cos \theta = 0.2935$, find the value of θ rounded to two decimal places if...

a) θ is in Quadrant I

$$\theta = \cos^{-1} 0.2935$$

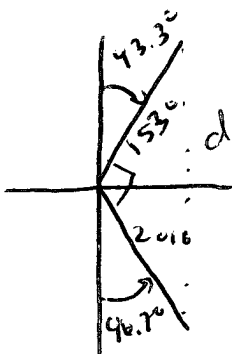
$$= \boxed{72.93^\circ}$$

b) θ is in Quadrant IV

$$\theta = 360 - 72.93^\circ$$

$$= \boxed{287.07^\circ}$$

6) (6 points) Two planes leave an airport going in different directions. The first plane travels at 510 miles per hour at a bearing of $N43.3^\circ E$. The second plane travels at 670 miles per hour at a bearing of $S46.7^\circ E$. How far apart are the planes after 3 hours? Draw a picture and round answer to 2 decimal places:

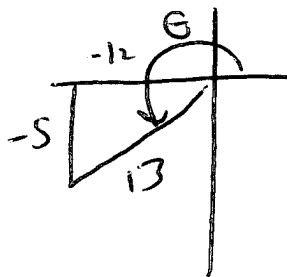


$$d = \sqrt{1530^2 + 2010^2}$$

$$\approx \boxed{2526.06 \text{ mi}}$$

[Signature]
2

7) (6 points) For the angle θ in Quadrant III where $\tan \theta = \frac{5}{12}$, find the 5 other trig functions:



$$\sin \theta = -\frac{5}{13} \quad \csc \theta = -\frac{13}{5}$$

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

$$\tan \theta = \frac{5}{12} \quad \cot \theta = \frac{12}{5}$$

8) (3 points each) Convert as directed. Round **only** part a to 4 decimal places:

a) $7^{\circ}35'20''$ to Degrees

$$7^{\circ} + 35' \cdot \frac{1^{\circ}}{60'} + 20'' \cdot \frac{1^{\circ}}{3600''}$$

$$= \boxed{7.5889^{\circ}}$$

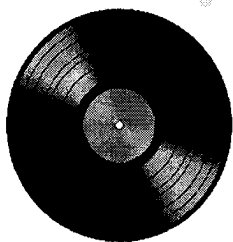
b) $\frac{7\pi}{6}$ to Degrees

$$\frac{7\pi}{6} \cdot \frac{180^{\circ}}{\pi} = \boxed{210^{\circ}}$$

c) 18° to Radians

$$18^{\circ} \cdot \frac{\pi}{180^{\circ}} = \boxed{\frac{\pi}{10}}$$

9) (8 points) A 12-inch diameter LP makes $33\frac{1}{3}$ revolutions per minute. Determine the linear speed of a point on the tip of the record in miles per hour. Round only the final answer to two decimal places:



There are 5,280 ft in a mile.

$$v = r \cdot \omega$$

$$r = \frac{6 \text{ in}}{1 \text{ rev}} \cdot \frac{1 \text{ ft}}{12 \text{ in}} \cdot \frac{1 \text{ mi}}{5280 \text{ ft}} = \frac{6 \text{ mi}}{63360 \text{ rev}}$$

$$\omega = \frac{33\frac{1}{3} \text{ rev}}{1 \text{ min}} \cdot \frac{2\pi \text{ rad}}{1 \text{ rev}} \cdot \frac{60 \text{ min}}{1 \text{ hr}} = \frac{4000\pi \text{ rad}}{1 \text{ hr}}$$

in \rightarrow ft \rightarrow mi
rev \rightarrow rad min \rightarrow hr

$$v = \frac{6 \text{ mi}}{63360 \text{ rev}} \cdot \frac{4000\pi \text{ rad}}{1 \text{ hr}} \Rightarrow \boxed{1.19 \text{ mph}}$$

10) (1 points each) Fill in the blank with the words "even" or "odd" to describe the type of function and then the correct values for the period:

	Type of Function	Period
Sine	beep	beep
Cosine	beep	beep
Tangent	beep	beep

	Type of Function	Period
Cosecant	ding	beep
Secant	beep	beep
Cotangent	ding	ding

35

11) (2 points) Concerning the graph of $\cot \theta = \frac{\cos \theta}{\sin \theta}$, when $\sin \theta = 0$, the graph of $\cot \theta$ had spiders and when $\cos \theta = 0$, the graph of $\cot \theta$ had ghost spiders

12) (3 points each) Given the point $\left(\frac{\pi}{4}, \frac{\sqrt{2}}{2}\right)$ on the graph of $y = f(\theta)$, find the **exact value** of the coordinates of the point under the transformation below:

a) $y = -3f(\theta)$ b) $y = f\left(\theta + \frac{\pi}{4}\right)$ c) $y = f(2\theta)$ d) $y = f(\theta) + 6$

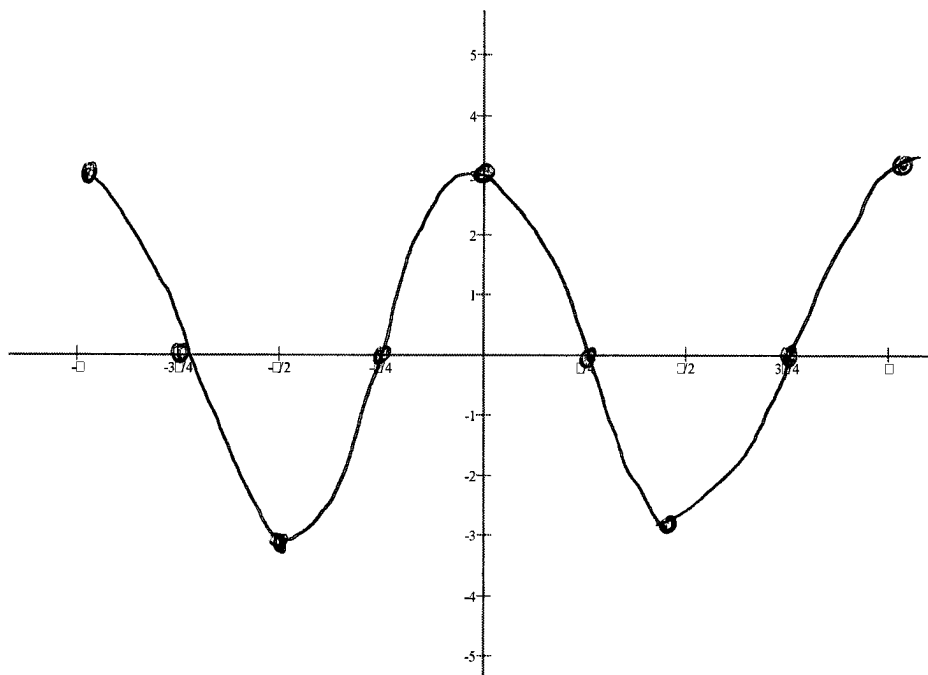
$\left(\frac{\pi}{4}, -\frac{3\sqrt{2}}{2}\right)$ $\left(0, \frac{\sqrt{2}}{2}\right)$ $\left(\frac{\pi}{8}, \frac{\sqrt{2}}{2}\right)$ $\left(\frac{\pi}{4}, \frac{\sqrt{2}}{2} + 6\right)$

13) For the function $y = 3 \sin\left(2\theta + \frac{\pi}{4}\right) := 3 \sin\left[2\left(\theta + \frac{\pi}{4}\right)\right]$

a) (3 points) Write the steps needed to graph the transformation:

- 1) ~~horizontal stretch~~ horizontal compress by 2
- 2) left $\frac{\pi}{4}$
- 3) vertically stretch by 3

b) (9 points) Sketch a graph of the function below. Fill in the whole axis from $[-\pi, \pi]$:



my
pi's
be
minors!

c) (2 points each) Determine the following:

- i) Domain ii) Range iii) Amplitude iv) Phase Shift v) Period
- \mathbb{R} $[-3, 3]$ 3 $\frac{\pi}{4}$ left $\left|\frac{2\pi}{2}\right| = \left|\frac{2\pi}{2}\right| = \pi$

36