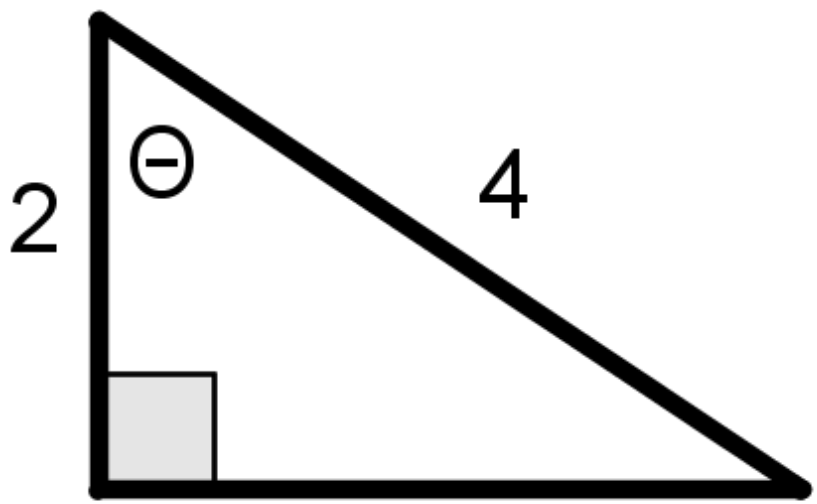
Precalculus D

7.1 – 7.5 Review

1. Find the exact value of csc Θ given the following triangle.



$$2^2 + opp^2 = 4^2$$

$$opp^2 = 12$$

$$opp = 2\sqrt{3}$$

$$\csc\theta = \frac{4}{2\sqrt{3}} = \frac{2\sqrt{3}}{3}$$

2. Given $\tan\theta=4$, find the exact value of $\cot(\pi/2-\theta)$

$$\tan\theta = \cot\left(\frac{\pi}{2}-\theta\right) \text{ (cofunctions)}$$

$$\tan\theta = \cot\left(\frac{\pi}{2}-\theta\right) = 4$$

3. Given $\tan\theta = 4$, find the exact value of $\sec^2(\theta)$

$$1 + \tan^2\theta = \sec^2\theta$$

$$1 + 4^2 = \sec^2\theta$$

$$17 = \sec^2\theta$$

4. Convert 18° into radians. Your answer should be exact.

$$\frac{18^{\circ}}{1} \bullet \frac{\pi}{180^{\circ}} = \frac{\pi}{10}$$

5. Convert $-5\pi/2$ into degrees

$$\frac{-5\pi}{2} \bullet \frac{180^\circ}{\pi} = -450^\circ$$

6. Convert 75°16’22’’ into degrees. Do not round at all.

$$75^\circ + \frac{16'}{1} \bullet \frac{1^\circ}{60'} + \frac{22''}{1} \bullet \frac{1'}{60''} \bullet \frac{1^\circ}{60'} = 75.272\overline{7}^\circ$$

7. Find the exact value of $3 \sin 45^{\circ} - 4 \tan (\pi/6)$

$$3\sin 45^{\circ} - 4\tan\left(\frac{\pi}{6}\right) = 3\left(\frac{\sqrt{2}}{2}\right) - 4\left(\frac{\sqrt{3}}{3}\right)$$

$$= \frac{3\sqrt{2}}{2} - \frac{4\sqrt{3}}{3} = \frac{9\sqrt{2}}{6} - \frac{8\sqrt{3}}{6}$$

$$= \frac{9\sqrt{2} - 8\sqrt{3}}{6}$$

8. Find the exact value of sec (−π/3) – cot (-5π/4)

$$\sec\left(-\frac{\pi}{3}\right)-\cot\left(-\frac{5\pi}{4}\right)=\sec\left(\frac{\pi}{3}\right)+\cot\left(\frac{5\pi}{4}\right)$$

$$=2+1=3$$

9. Find the exact value of $\tan \pi + \sin \pi$

$$\tan \pi + \sin \pi = 0 + 0 = 0$$

10. Find the exact value of cos (-540°) – tan (-405°)

$$\cos\left(-540^{\circ}\right)-\tan\left(-405^{\circ}\right)=\cos\left(540^{\circ}\right)+\tan\left(405^{\circ}\right)$$

$$=\cos\left(180^{\circ}\right)+\tan\left(45^{\circ}\right)=-1+1=0$$

11. Find the exact value of

$$\sin^2 20° + \frac{1}{\csc^2 70°}$$

$$= \sin^2 20° + \sin^2 70°$$

$$= \sin^2 20° + \cos^2 \left(90° - 70°\right)$$

$$= \sin^2 20° + \cos^2 20°$$

$$= 1$$

12. Simplify without using a calculator

tan 40° sec (-50°) sin 40°

$$\tan 40^\circ \sec\left(-50^\circ\right)\sin 40^\circ$$

$$= \tan 40^\circ \sec 50^\circ \sin 40^\circ$$

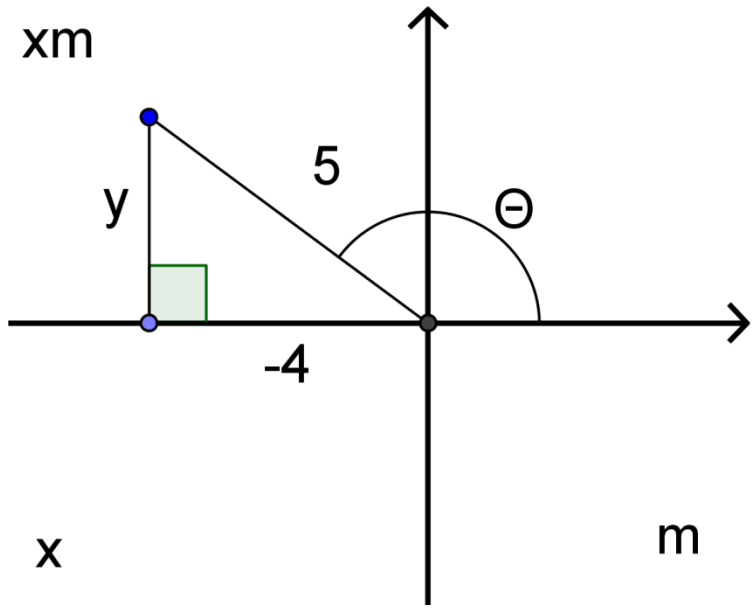
$$= \tan 40^\circ \csc\left(90^\circ - 50^\circ\right)\sin 40^\circ$$

$$= \tan 40^\circ \csc 40^\circ \sin 40^\circ$$

$$= \tan 40^\circ \frac{1}{\sin 40^\circ} \sin 40^\circ$$

$$= \tan 40^\circ$$

13. Find the exact value of csc θ, given sec θ = -5/4 and tan θ < 0



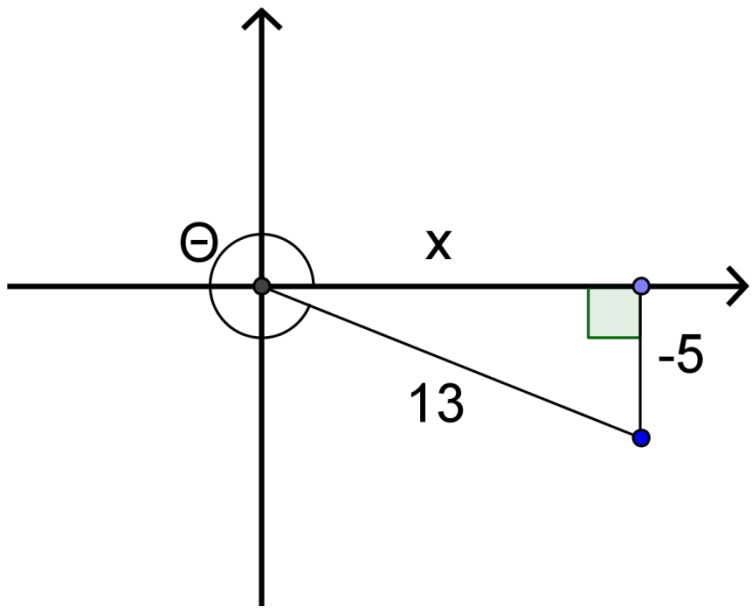
$$y^2 + (-4)^2 = 5^2$$

$$y = \pm 3$$

$$y = 3$$

$$\csc\theta = \frac{5}{3}$$

14. Find the exact value of cot θ, given that sin θ = -5/13 and 3π/2<θ<2π



$$x^2 + (-5)^2 = 13^2$$

$$x = \pm 12$$

$$x = 12$$

$$\cot\theta = -\frac{12}{5}$$

15. Find the area of the sector subtended by a central angle of 30° in a circle with a radius of 2 feet.

$$A = \pi r^2 \frac{\theta}{360°}$$

$$A = \pi \left(2_{ft}\right)^2 \frac{30°}{360°}$$

$$A = \frac{\pi}{3} ft^2 \approx 1.05_{ft^2}$$

16. The minute hand of a clock is 8 inches long. How far does the tip of the minute hand move in 20 minutes?

$$s = 2\pi r \frac{\theta}{360°}$$

$$s = 2\pi\left(8_{in}\right)\frac{20_{\min}}{60_{\min}}$$

$$s = \frac{16\pi}{3} in \approx 16.76_{in}$$

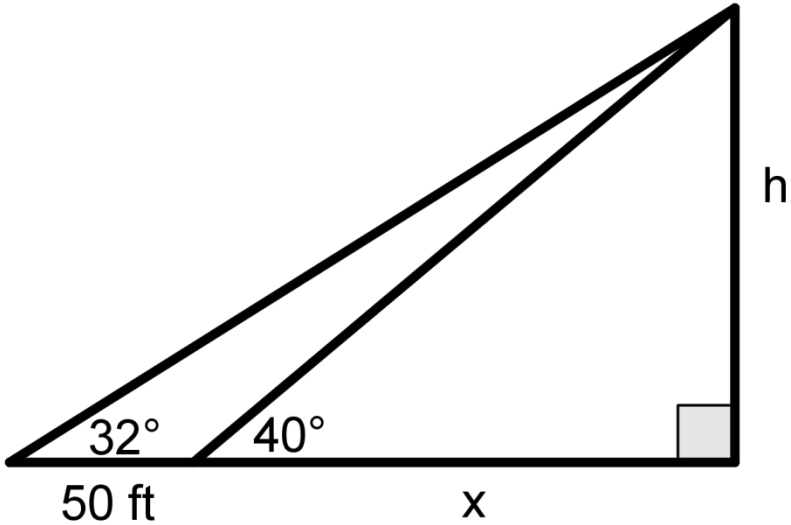
17. A merry-go-round has a radius of 25 feet. If the time for 16 revolutions is 2 minutes find the linear speed in mph.

$$\omega = \frac{\theta}{t} = \frac{16_{rev}}{2_{\min}} = 8_{\frac{rev}{\min}}$$

$$v = r\omega = \frac{25_{ft}}{1} \cdot \frac{8_{rev}}{1_{\min}} \cdot \frac{2\pi}{1_{rev}} \cdot \frac{60_{\min}}{1_{hr}} \cdot \frac{1_{mi}}{5280_{ft}}$$

$$v \approx 14.28_{mph}$$

18. To measure the height of a building, two sightings are taken a distance of 50 feet apart on level ground. If the 1st angle of elevation is 40° and the second is 32°, what is the height of the building?



$$\tan 40° = \frac{h}{x}; \tan 32° = \frac{h}{50 + x}$$

$$x \tan 40° = h = 50 \tan 32° + x \tan 32°$$

$$x \tan 40° - x \tan 32° = 50 \tan 32°$$

$$x\left(\tan 40° - \tan 32°\right) = 50 \tan 32°$$

$$x = \frac{50 \tan 32°}{\tan 40° - \tan 32°}$$

$$h = \frac{50 \tan 32°}{\tan 40° - \tan 32°} \tan 40°$$

$$h \approx 122.37_{ft}$$

19. Find cos $(2\pi/5)$. Round to four decimal places.

$$\cos\left(\frac{2\pi}{5}\right) \approx 0.3090$$

20. Find csc (229°). Round to four decimal places.

$$\csc\left(229^{\circ}\right) \approx -1.3250$$

21. If f(x)=sin x and f(a)=3/5, find f(-a)

$$\sin\left(-a\right) = -\sin a = -\frac{3}{5}$$