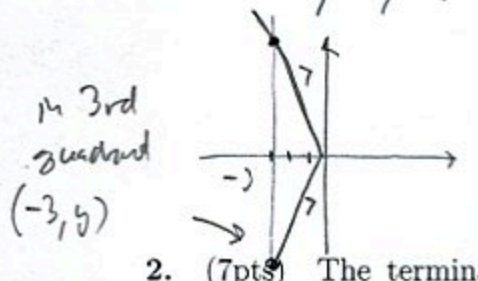
Trigonometry — Joysheet 2
MAT 145, Spring 2017 — D. Ivanšić

Name: Soul Ocean

Covers: 6.3, 6.4 *Show all your work!*

1. (9pts) If $\cos\theta = -\frac{3}{7}$ and θ is in the third quadrant, find the exact values of all the trigonometric functions of θ. Draw a picture.

$\cos\theta = -\frac{3}{7} = \frac{-3}{7} = \frac{x}{r}$



$(-3)^2 + y^2 = 7^2$

$9 + y^2 = 49$

$y^2 = 40$

$y = \pm\sqrt{40} = \pm 2\sqrt{10}$

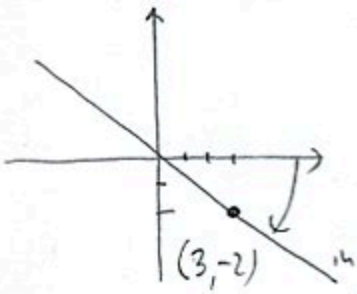
$y = -2\sqrt{10}$ b/c of 3rd quad.

$\sin\theta = -\frac{2\sqrt{10}}{7}$ $\quad \csc\theta = -\frac{7}{2\sqrt{10}} = -\frac{7\sqrt{10}}{20}$

$\tan\theta = \frac{-2\sqrt{10}}{-3} = \frac{2\sqrt{10}}{3}$ $\quad \cot\theta = \frac{3}{2\sqrt{10}} = \frac{3\sqrt{10}}{20}$

$\sec\theta = -\frac{7}{3}$

2. (7pts) The terminal side of angle θ is in the fourth quadrant and lies on the line $2x + 3y = 0$. Find the exact values of $\sin\theta$ and $\cot\theta$. Draw a picture.



$2x + 3y = 0$

$y = -\frac{2}{3}x$

slope $= -\frac{2}{3}$

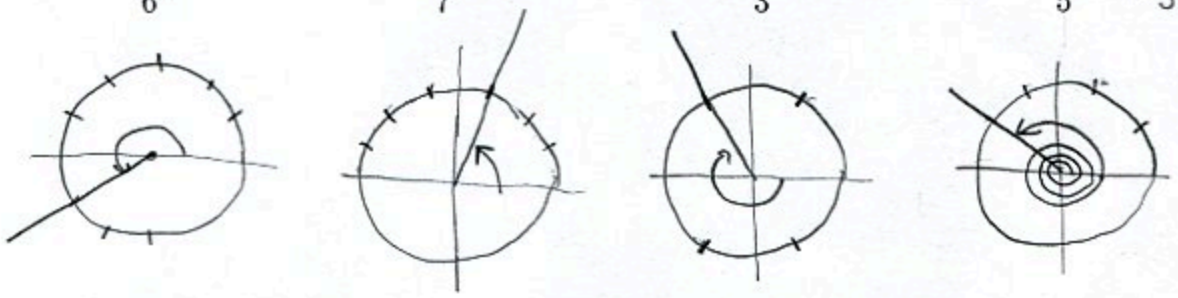
$r = \sqrt{3^2 + (-2)^2} = \sqrt{13}$

$\sin\theta = \frac{-2}{\sqrt{13}} = -\frac{2\sqrt{13}}{13}$

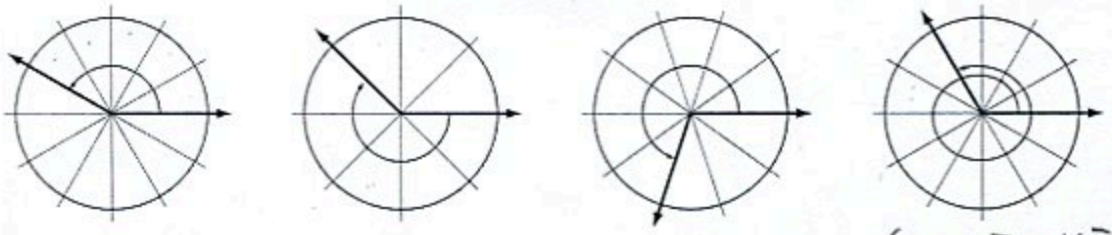
$\cot\theta = \frac{3}{-2} = -\frac{3}{2}$

3. (8pts) Sketch angles in standard position with indicated radian measure.

$\frac{7\pi}{6}$ $\quad \frac{3\pi}{7}$ $\quad -\frac{4\pi}{3}$ $\quad \frac{34\pi}{5} = 6\frac{4}{5}\pi$



4. (8pts) Indicate both the radian and degree measure under the following angles. (Use equally-spaced lines to help you determine what the angles are.)



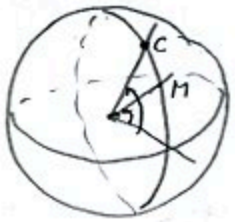
$\frac{5\pi}{6}$ $\quad 150^\circ$

$-\frac{5\pi}{4}$ $\quad -225^\circ$

$\frac{7\pi}{5}$ $\quad 252^\circ$

$\frac{(12+4)\pi}{6} = \frac{16\pi}{6} = \frac{8\pi}{3}$ $\quad 360^\circ + 120^\circ = 480^\circ$

5. (8pts) Chicago, IL, is directly north of Mobile, AL and their latitudes are 41°50′13″N and 30°41′40″N, respectively. What is the distance along the Earth's surface between the cities, if the radius of Earth is 3960 miles?



$\theta = 41°50'13'' - 30°41'40''$

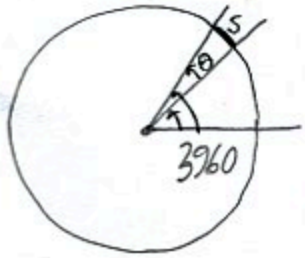
$= 11.1425°$

θ in radians

$s = r\theta$

$= 3960 \cdot 11.1425 \cdot \frac{\pi}{180}$

$= 770.114315$ miles



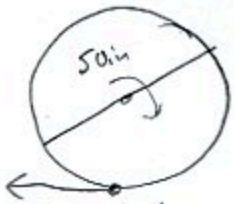
6. (8pts) The tip of the second-hand on a clock is 5 centimeters away from the center. As the second-hand rotates, what is its linear speed in centimers per second?

$v = r\omega$

$v = 5_{cm} \cdot \frac{2\pi}{60\ sec} = \frac{10\pi}{60} = \frac{\pi}{6}$ cm/sec

$v = 0.523599$ cm/sec

7. (12pts) A truck whose tires have outside diameter 50in is traveling at 45mph.
a) What is the angular speed of the tires?
b) How many revolutions per minute do the tires make?



this pt. has linear speed 45mph

$r = \frac{50}{2} = 25$

a) $v = r\omega$

$45\ mph = 25\ in \cdot \omega$

$\frac{45\ mi}{hr} \cdot \frac{5280\ ft}{1\ mi} \cdot \frac{12\ in}{1\ ft} = 25\ in \cdot \omega$

$2851200\ in/hr = 25\ in \cdot \omega$

$\omega = \frac{2851200}{25} \frac{in/hr}{in} = 114048\ rad/hr$

b) $\frac{114048\ rad}{hr} \cdot \frac{1\ rev}{2\pi\ rad} \cdot \frac{1\ hr}{60\ min}$

$= 302.521716$ rpm