Math 1149
Spring 2013

Midterm 1
Form A

Name: _____
OSU user name (name.nn): _____
Instructor: _____
Class Time: _____

The point value of each problem is indicated. To obtain full credit you must have the correct answers along with **the supporting work**. Answers without supporting work will receive no credit, except for multiple choice problems. **CIRCLE YOUR ANSWERS**.

1. (20 points) **Circle your answer, or fill in the blank.**

   (a) Find the degree measure of the angle with the radian measure $\frac{19\pi}{12}$.

   i) 570 ii) 285 iii) 0.087 iv) not listed

   $\frac{19\pi}{12}\left(\frac{180}{\pi}\right) = 285^\circ$

   (b) Find the radian measure of the angle with the degree measure $-130°$.

   i) -2.269 ii) -7448 iii) -1.134 iv) not listed

   $-130\left(\frac{\pi}{180}\right) = -\frac{13\pi}{18}$

   (c) The measures of two angles in standard position are: $\frac{5\pi}{7}$ and $\frac{40\pi}{7}$. Are these two angles coterminal?

   i) Yes ii) No

   Not 40

   $\frac{33\pi}{7} + \frac{14\pi}{7} = \frac{47\pi}{7}$

   equal to 2π

   $\frac{5\pi}{7} + \frac{14\pi}{7} = \frac{19\pi}{7}$

   $\frac{19\pi}{7} + \frac{14\pi}{7} = \frac{33\pi}{7}$

   (d) The measure of an angle in standard position is $-500°$. A positive angle which is coterminal with the given angle is:

   i) $-140°$ ii) $40°$ iii) $580°$ iv) not listed

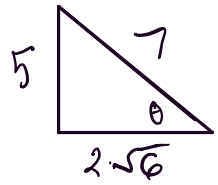
   $-500 + 360 + 360 = 220 + 360 = 580$

   (e) Find an angle between $0°$ and $360°$ that is coterminal with $1560°$.

   $1560 - 1440 = 120$

   120°

2. (a) (12 points) **Sketch** a triangle that has an acute angle θ, and **find** the other trigonometric ratios of θ, if $\sin(\theta) = \frac{5}{7}$.



$5^2 + x^2 = 7^2$

$25 + x^2 = 49$

$-25 \quad -25$

$x^2 = 24$

$x = \sqrt{24} = 2\sqrt{6}$

$\csc(\theta) = \frac{7}{5}$

$\cos(\theta) = \frac{2\sqrt{6}}{7}$

$\sec(\theta) = \frac{7\sqrt{6}}{12}$

$\tan(\theta) = \frac{5\sqrt{6}}{12}$

$\cot(\theta) = \frac{2\sqrt{6}}{5}$

$\frac{5}{2\sqrt{6}} \cdot \frac{\sqrt{6}}{\sqrt{6}} = \frac{5\sqrt{6}}{2 \cdot 6}$

SohCahToa

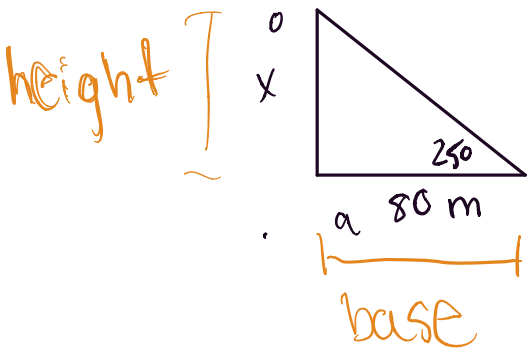
$\frac{1}{\cos} \rightarrow \sec$

$\frac{1}{\sin} \rightarrow \csc$

$\frac{1}{2\sqrt{6}} \cdot \frac{\sqrt{6}}{\sqrt{6}} = \frac{7\sqrt{6}}{2 \cdot 6} = \frac{7\sqrt{6}}{12}$

$\sqrt{6}^2 = 6$

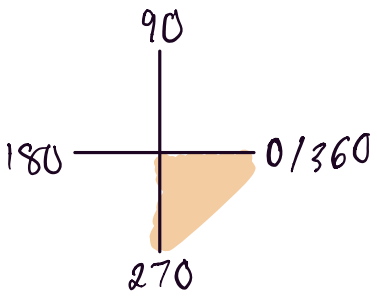
(b) (8 points) How tall is a building if the angle of elevation from the ground is 25° at a distance of 80m from the base of the building.



$\tan(25) = \frac{x}{80}$

$80 \tan(25) = x$

plug in calculator



360 − 280 = 80

3. (20 points) **Circle your answer.**

(a) Find the reference angle for 280°.

↳ horizontal axis always

i) 280° ii) 80° iii) 10° iv) not listed

(b) Find the quadrant in which an angle θ lies, if $\sin(\theta) < 0$ and $\cos(\theta) > 0$.

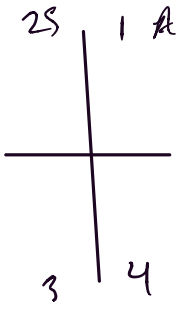
i) I ii) II iii) III iv) IV

only sin is positive ← S A → all are positive

only tan positive ← T C → only cos positive

(c) Find the value of $\sin(\theta)$ if $\cos(\theta) = \frac{-4}{5}$ and θ is in quadrant II.

→ a → H



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

$x^2 + 16 = 25$

$-16 \quad -16$

$x^2 = 9$

$x = 3$

i) $\frac{1}{5}$ ii) $\frac{-3}{5}$ iii) $\frac{3}{5}$ iv) not listed

$\frac{3}{5}$

(d) Find the area of an equilateral triangle with sides of length 5 in.

i) 21.6 ii) 6.25 iii) 10.8 iv) not listed

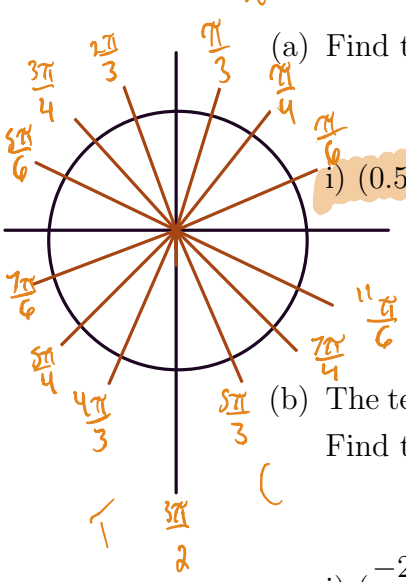
Not on this midterm

(e) Write $\tan(\theta)$ in terms of $\sin(\theta)$, where θ is an angle in quadrant II.

i) $\frac{-\sin(\theta)}{\sqrt{1-\sin^2(\theta)}}$ ii) $\frac{\sin(\theta)}{\sqrt{1-\sin^2(\theta)}}$ iii) $\frac{-\sqrt{1-\sin^2(\theta)}}{\sin(\theta)}$ iv) not listed

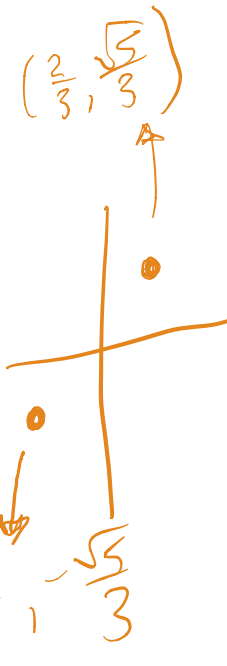
$\frac{\pi}{6}$ $\frac{\pi}{4}$ $\frac{\pi}{3}$ $\frac{\pi}{2}$

4. (20 points) **Circle your answer.**



(a) Find the terminal point $P(x, y)$ on the unit circle determined by $t = \frac{5\pi}{3}$.

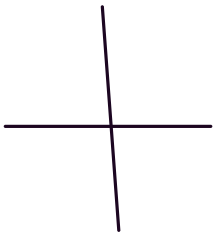
i) $(0.5, -0.87)$ ii) $(-0.87, 0.5)$ iii) $(0.99, 0.09)$ iv) not listed



(b) The terminal point on the unit circle determined by t is the point $P = (\frac{2}{3}, \frac{\sqrt{5}}{3})$. Find the terminal point determined by $t - \pi$.

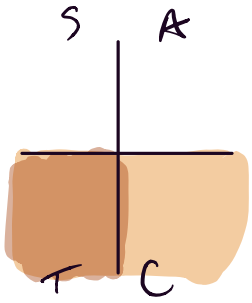
i) $(\frac{-2}{3}, \frac{\sqrt{5}}{3})$ ii) $(\frac{-2}{3}, \frac{-\sqrt{5}}{3})$ iii) $(\frac{2}{3}, \frac{-\sqrt{5}}{3})$ iv) not listed

(c) Find the sign of $\csc(t)$ if $\cos(t) > 0$ and $\cot(t) < 0$.



i) Positive ii) Negative

(d) Find $\tan(t)$ if $\sin(t) = \frac{-3}{4}$ and $\sec(t) < 0$.



i) $\frac{3}{\sqrt{7}}$ ii) $\frac{-3}{\sqrt{7}}$ iii) 3 iv) not listed

(e) Determine whether the function $f(x) = 3x^2 + \cos(x)$ is even, odd, or neither.

i) Even ii) Odd iii) Neither

5. (a) (8 points) A sector of a circle has an angle of 50°. Find the area of the sector if the radius of the circle is 6 ft. Round your answer to two decimal places.

$\frac{1}{2} r^2 \theta$ $\quad 50^\circ\left(\frac{\pi}{180^\circ}\right) = \frac{5\pi}{18}$

$\frac{1}{2}(6)^2\left(\frac{5\pi}{18}\right)$

$\frac{1}{2}(36)\left(\frac{5\pi}{18}\right) \approx 15.71$

(b) (12 points) Given $y = 3\sin(\frac{\pi}{4}x + \frac{\pi}{2})$, fill in the blank:

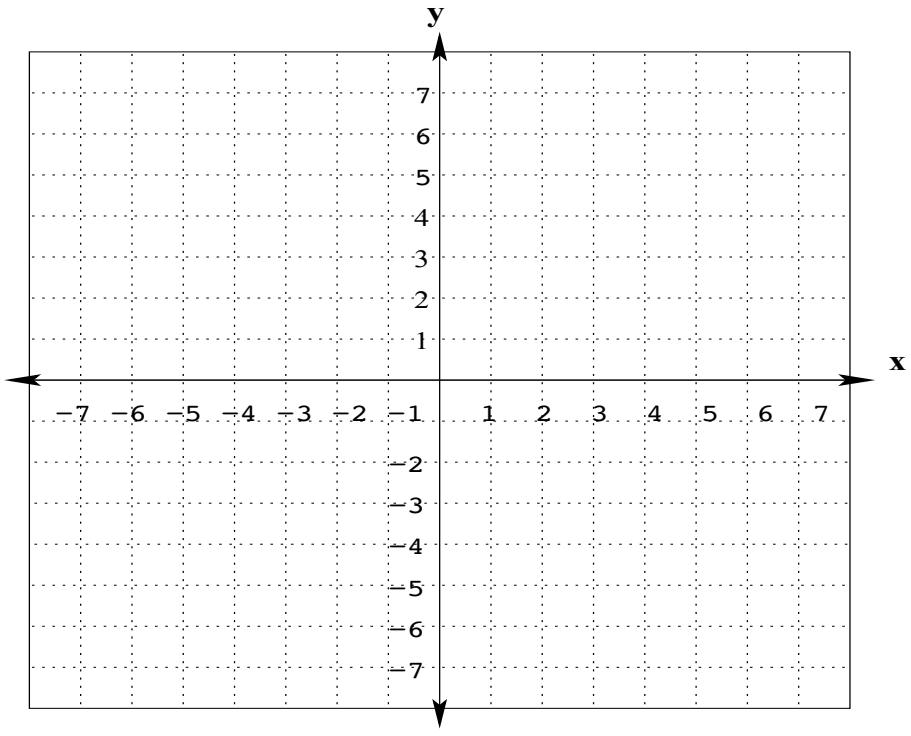
Amplitude: 3 To lazy use calculator

Period: _____

Phase shift: _____

An appropriate interval on which to graph one complete period: _____

Graph one complete period, **clearly indicating the x-intercepts**.



Formula Sheet

- Area of a triangle with sides of length a, b, and incuded angle θ:

$$A = \frac{1}{2}ab\sin(\theta)$$

- Trigonometric identities:

$$\sin^2(\theta) + \cos^2(\theta) = 1$$
$$1 + \tan^2(\theta) = \sec^2(\theta)$$
$$1 + \cot^2(\theta) = \csc^2(\theta)$$

,