

Math 173 – Quiz #1

January 22, 2016
 Instructor: Patricia Wrean

Name: Solution Set

Total: 40 points

1. Use your calculator to calculate the approximate value of the following. Round to two decimal places. (3 points)

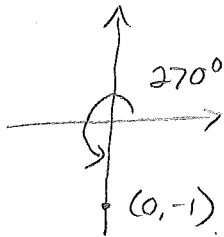
a) $\tan -85.1^\circ \approx -11.6645$ -11.66

b) $\sin 254^\circ \approx -0.961262$ -0.96

c) $\csc 131.3^\circ = \frac{1}{\sin 131.3^\circ} \approx 1.33109$ 1.33

2. Give the exact function value of the following. Show your work. (2 points)

$\cot 270^\circ$ 0



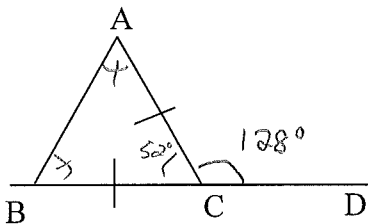
quadrantal - on neg y-axis

$$\tan 270^\circ = \frac{y}{x} = \frac{-1}{0}$$

$$\cot 270^\circ = \frac{1}{\tan 270^\circ} = \frac{0}{-1} = 0$$

① if said
 $\cot 270^\circ = \frac{1}{\tan 270^\circ} = \frac{1}{\frac{opp}{adj}} = \frac{adj}{opp}$
 and/or $\tan 270^\circ$
 undefined
 but then get
 wrong answer

3. Angle ACD measures 128° . Calculate the size of angle ABC as shown in the diagram. Show your work. (3 points)



$$\angle ACB = 180^\circ - 128^\circ = 52^\circ$$

$$\angle ABC + \angle BAC + \angle ACB = 180^\circ$$

← equal since Δ isosceles ↑ 52°

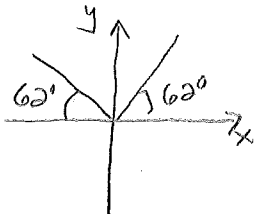
$$2\angle ABC = 180^\circ - 52^\circ$$

$$\angle ABC = 64^\circ$$

① calc of 52°
 ① some indication of isosceles/equal angles
 ① answer

4. Calculate θ given the following information. Round your answer to the nearest integer. (6 points)

a) $\sin \theta = 0.88$ and $0 \leq \theta \leq 360^\circ$



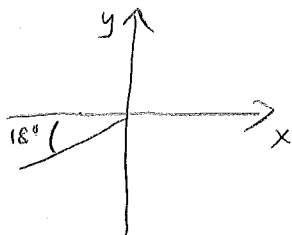
$\sin^{-1}(0.88) = 61.64^\circ$
 $= 62^\circ \in \text{in QI}$ ①

$\theta = 62^\circ, 118^\circ$ ①

(no coterminals ①)

b) $\tan \theta = 0.32$ and $\cos \theta$ is negative

Q II + III Q II + III
 so θ in Q III



$\tan^{-1}(0.32) = 17.7447^\circ$
 $= 18^\circ$ ①

$\theta = 198^\circ$ or coterminal ①

5. State the domains of the functions $f(x) = 2x - 5$, $g(x) = \frac{1}{\sqrt{x-4}}$ and $h(x) = \frac{1}{\sqrt{x-4}}$.

Also, calculate $h(1)$. (5 points)

domain of f : \mathbb{R} ①

domain f : all real

domain of g : $\{x \mid x > 4\}$ ①
 or $(4, \infty)$

domain g : sqrt root not neg $x \geq 4$
 denom not zero $x \neq 4$

domain of h : $\{x \mid x \geq 0 \text{ and } x \neq 16\}$ ②
 or $[0, 16) \cup (16, \infty)$

domain h : sqrt not neg $x \geq 0$

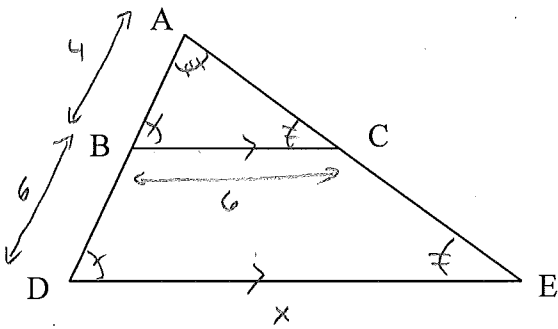
$h(1)$: $-\frac{1}{3}$ ①

denom not zero
 $\sqrt{x} \neq 4$
 $x \neq 16$

$h(1) = \frac{1}{\sqrt{1-4}} = \frac{1}{1-4} = -\frac{1}{3}$

For the following two questions, show your work by labeling any congruent angles on the diagram, stating which triangles are similar and why if you are using similarity properties, and clearly labeling which sides you are using if setting up a ratio.

6. AB is 4, and BC and BD are both 6. Line DE is parallel to BC. Find DE. (4 points)



angles on diagram
 (1/2)

$\triangle ABC \sim \triangle ADE$ by AAA (1/2)

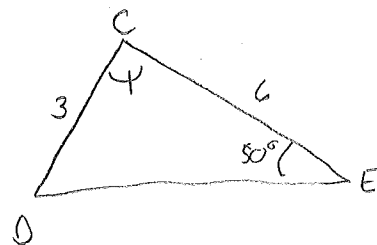
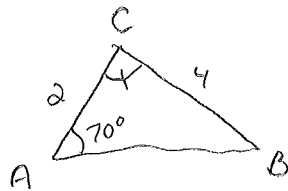
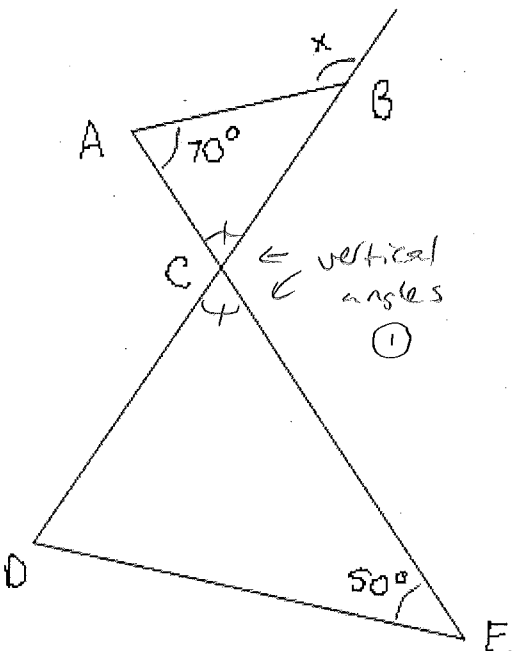
so $k = \frac{AB}{AD} = \frac{BC}{DE}$ (1)

$\frac{4}{10} = \frac{6}{x}$

$x = \frac{6 \cdot 10}{4} = 15$

DE = 15 (1)

7. In the diagram below, AC = 2, BC = 3, CD = 4, and CE = 6. Calculate angle x as shown in the diagram. (6 points)



test for similarity:

is $\frac{AC}{CD} = \frac{BC}{CE}$?

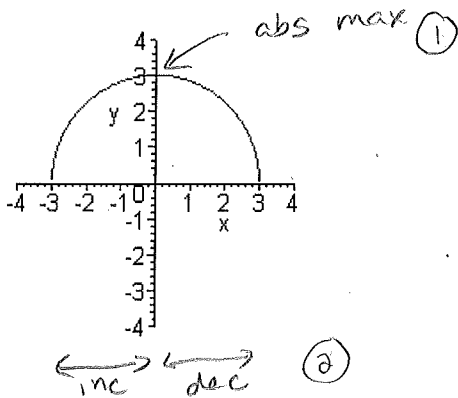
$\frac{2}{4} = \frac{3}{6}$ ✓

so $\triangle ABC \sim \triangle DEC$ by SAS (1) (2)

so $\angle ABC = 50^\circ$ and $x = 180^\circ - 50^\circ = 130^\circ$ (1) (1)

show ratio but no SAS (-1)
 just AAA or SSS (2)

8. Consider the function graphed below. Locate the maximum point on the graph and state whether it's an absolute or relative maximum. Also, indicate on the graph the regions where the function is increasing/decreasing. Lastly, state the domain and range of this function. Just in case it's not clear, the graph starts and ends at the points $(\pm 3, 0)$. (5 points)



domain: $[-3, 3]$ (1)

range: $[0, 3]$ (1)

9. A weather balloon is just about to be launched, and is currently tied to the ground by two wire cables. The left cable is 3.5 metres long. The left and right cables make angles with the ground of 48° and 35° , respectively. Assuming that the ground is perfectly level and the cables form straight lines, what is the length of the right-hand cable? (6 points)

in left triangle:

$$\sin 48^\circ = \frac{h}{3.5} \quad (1)$$

$$h = 3.5 \sin 48^\circ \quad (1)$$

(≈ 2.60101 if you wish to calculate it here)

in right triangle:

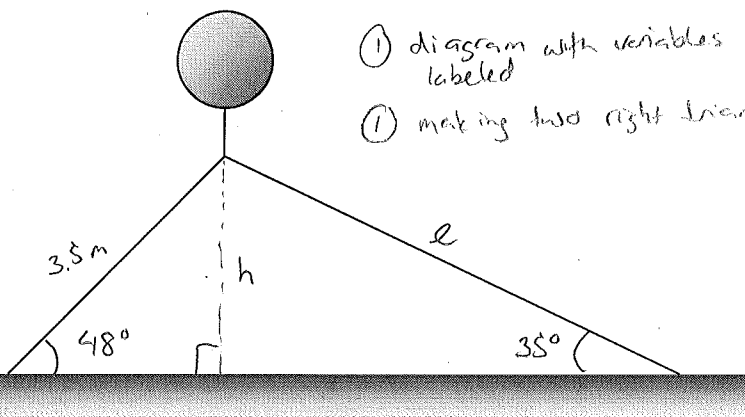
$$\sin 35^\circ = \frac{h}{l} \quad (1)$$

$$l = \frac{h}{\sin 35^\circ}$$

$$= \frac{3.5 \sin 48^\circ}{\sin 35^\circ}$$

$$\approx 4.53472$$

$$\approx 4.5 \text{ m} \quad (1)$$



(1) diagram with variables labeled

(1) making two right triangles

The right-hand cable is 4.5 m long.