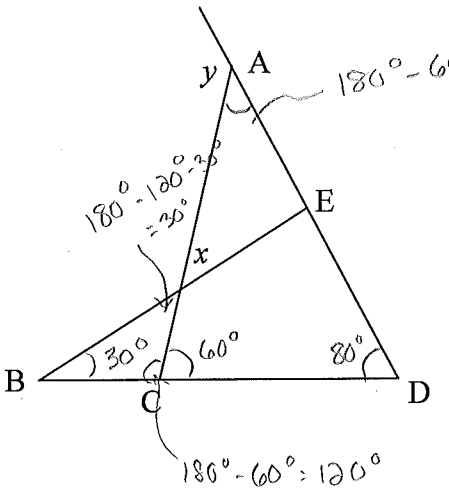
Math 173 – Assignment #1 **Name:** Solution Set

Total = 50

1. ∠EBD is 30°, ∠ACD is 60° and ∠BDA is 80°. Calculate angles x and y as shown on the diagram. Show your work.



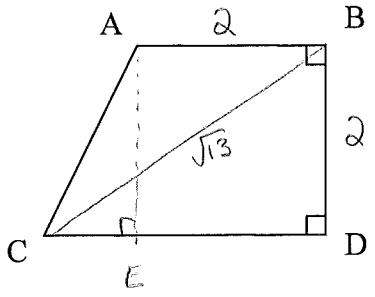
$y = 180° - \angle CAD$
$= 180° - 40°$
$= 140°$

$x = 30°$ (vertical angles)

(2)

2. AB and AD are both 2 units long, while BC is $\sqrt{13}$ units long. Find the length of AC.

$AC = \sqrt{5}$



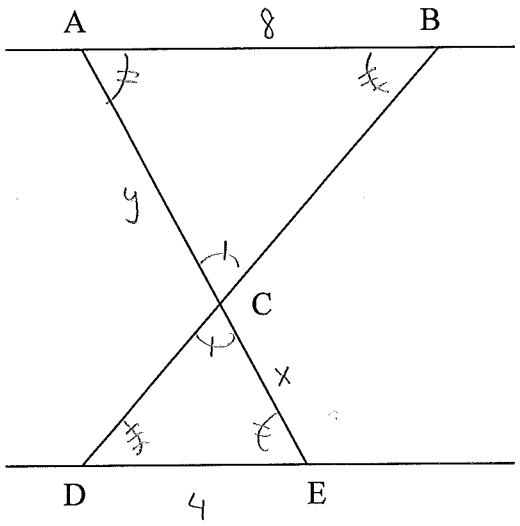
$a^2 + b^2 = c^2$
$BD^2 + CD^2 = BC^2$
$2^2 + CD^2 = (\sqrt{13})^2$
$CD^2 = 13 - 4 = 9$
$CD = 3$

$DE = 2$, so $DE = 2$ and $CE = 1$

$a^2 + b^2 = c^2$
$CE^2 + AE^2 = AC^2$
$1^2 + 2^2 = AC^2$
$AC^2 = 5$
$AC = \sqrt{5}$

(2)

3. Lines AB and DE are parallel. AB = 8, DE = 4, and AE = 12. Calculate the length of AC. Show your work.



AC = 8

(1)

$\triangle ABC \sim \triangle EDC$ by AAA (1)

so $\frac{AB}{ED} = \frac{AC}{EC}$

$\frac{8}{4} = \frac{y}{x}$

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

$2x = y$ (1)

and $x + y = 12$

$x + 2x = 12$

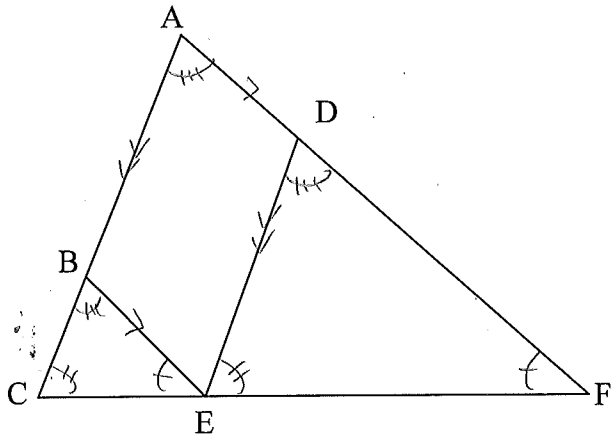
$3x = 12$

$x = 4$

$y = 8$ (1)

(4)

4. BE is parallel to AF, and DE is parallel to AC. ΔDEF has an area that is four times as big as the area of ΔBCE. If EF = 6, find the length of CF. Show your work. (4 points)



no congruent angles marked (-½)

CF = 9

(1)

$\triangle BCE \sim \triangle DEF$ by AAA (1)

area of $\triangle DEF$ = 4 (area of $\triangle BCE$)

" $= k^2$ (")

so $k^2 = 4$

$k = 2$ ← scale factor (1)

$\frac{EF}{CE} = k = 2$

$\frac{6}{CE} = 2$

$CE = 3$

$CF = CE + EF$

$= 3 + 6 = 9$ (1)

(4)

5. Use your calculator to calculate the approximate value of the following. Round to three decimal places.

a) $\cos -36.5° = 0.803857$ 0.804

b) $\sec 92° = \frac{1}{\cos 92°} = -28.6537$ -28.654

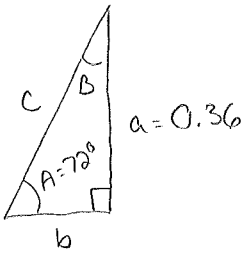
c) $\tan -325° = 0.700208$ 0.700

d) $\sin 65° = 0.906308$ 0.906

(4)

6. Solve the right triangle that has A = 72° and $a = 0.36$.

$B = 18°$, $b = 0.12$, $c = 0.38$



$B = 90° - A$
$= 18°$

$\tan A = \frac{a}{b}$

$b = \frac{a}{\tan A} = \frac{0.36}{\tan 72°} = 0.116971 = 0.12$

(3)

wrong Δ:
b = 1.11
c = 1.16

$\sin A = \frac{a}{c}$

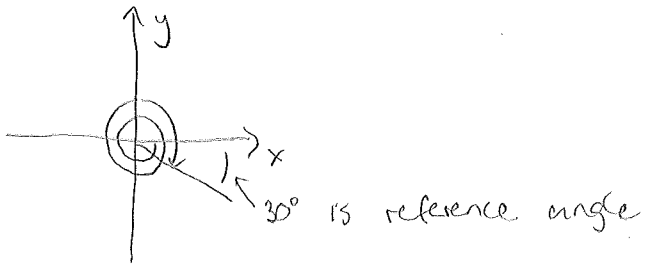
$c = \frac{a}{\sin A} = \frac{0.36}{\sin 72°} = 0.378526 = 0.38$

7. Sketch the angle –750° in standard position (include the swirly line to show the number of revolutions), and list one positive and one negative coterminal angle.

$-30°$, $330°$

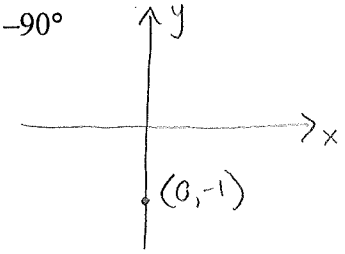
(among many other possible answers)

(2)



8. Give the exact function value of the following. Show your work.

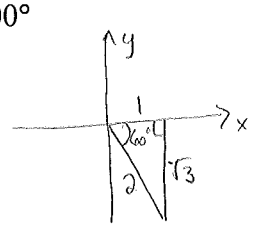
a) tan –90°



$\tan -90^\circ = \frac{y}{x} = \frac{-1}{0} =$ undef

undefined

b) csc 300°

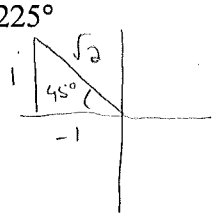


$\sin 300^\circ = -\frac{\sqrt{3}}{2}$

$\csc 300^\circ = -\frac{2}{\sqrt{3}} = -\frac{2\sqrt{3}}{3}$

$-\frac{2\sqrt{3}}{3}$

c) sin –225°



$\sin -225^\circ = \frac{1}{\sqrt{2}} = \frac{\sqrt{2}}{2}$

$\sqrt{2}/2$

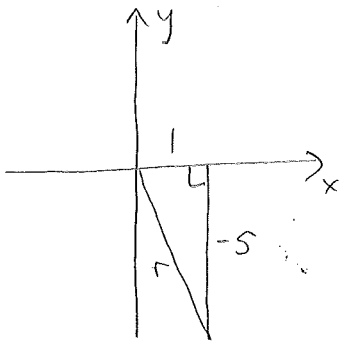
(6)

9. Given that $\cot\theta = -\frac{1}{5}$ and that $\sin\theta$ is negative, find the other five trig functions of θ. Give exact answers.

so $\tan\theta = \frac{-5}{1}$, Q II, IV

$\sin\theta < 0$ Q III IV

so in QIV



$x^2 + y^2 = r^2$

$1 + 25 = r^2$

$r = \sqrt{26}$

(r must be +)

$\sin\theta = \frac{-5}{\sqrt{26}} = -\frac{5\sqrt{26}}{26}$

$\cos\theta = \frac{+1}{\sqrt{26}} = \frac{\sqrt{26}}{26}$

$\tan\theta = -5$

$\csc\theta = -\frac{\sqrt{26}}{5}$ $\sec\theta = \sqrt{26}$

(5)

10. Use the cofunction and recipocal identities to fill in the blanks.

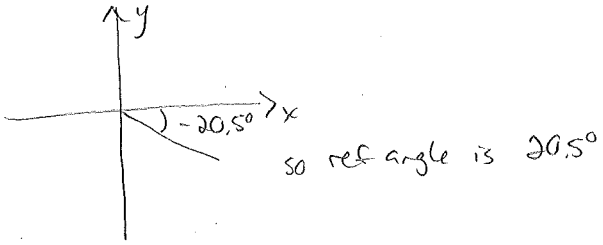
$\cos 25^\circ = \frac{1}{\text{sec}\ 25^\circ} = \frac{\sin}{\ } 65^\circ = \frac{1}{\text{csc}\ 65^\circ}$

(2)

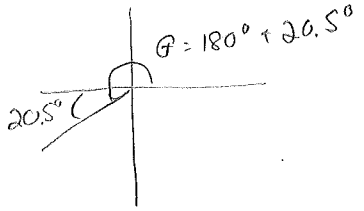
11. If $\sin\theta = -0.35$ and θ is in Q III, find θ.

$\theta = 200.5^\circ$ or coterminal

$\sin^{-1}(-0.35) = -20.4873^\circ$



so ref angle is 20.5°



(3)

12. Find the domain of the following function. Also, calculate $f(4)$.

$$f(x) = \frac{\sqrt{x}}{x-1}$$

$\sqrt{x}$ must have $x \geq 0$

$\frac{1}{x-1}$ must have $x \neq 1$

$[0, 1) \cup (1, \infty)$

$f(4) = 2/3$

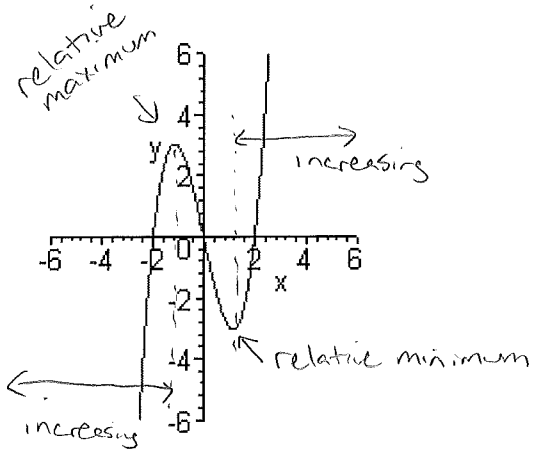
(3)

domain: $\{x \mid x \neq 1 \text{ and } x \geq 0\}$

or $[0, 1) \cup (1, \infty)$

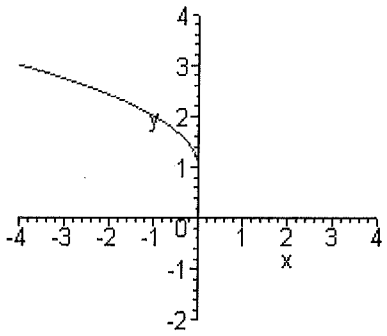
$$f(4) = \frac{\sqrt{4}}{4-1} = \frac{2}{3}$$

13. Consider the function graphed below. Label any maxima and/or minima, stating whether they are relative or absolute. Also, indicate on the graph any intervals where the function is increasing.



(3)

14. Consider the graph below. State whether y is a function of x for this graph, and give the domain and range. (Just in case it's not clear, the graph starts at (0,1) and then moves up and off to the left.)



yes, it's a function
(passes vertical line test)

domain: $(-\infty, 0]$ or $\{x \mid x \leq 0\}$

range: $[1, \infty)$ or $\{y \mid y \geq 1\}$

(3)

15. Winnie the Pooh is flying a helium balloon whose string is 10 metres long. Because of a breeze, the line makes an angle of 75° with respect to the ground. Dangling 3 metres directly below the balloon is Piglet. How far away from Winnie is Piglet? (5 points)

$\cos 75^\circ = \frac{d}{10m}$

$d = 10 \cos 75^\circ$

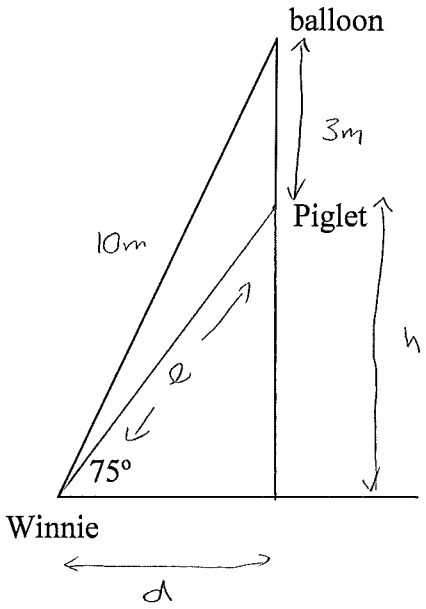
$= 2.58819$

$\sin 75^\circ = \frac{h+3}{10}$

$h+3 = 10 \sin 75^\circ$

$h = 10 \sin 75^\circ - 3$

$= 6.65926$



(5)

Pythagorus: $\ell^2 = d^2 + h^2$

$= (2.58819)^2 + (6.65926)^2$

$\ell = 7.14454$

Piglet is 7 m away from Winnie the Pooh.