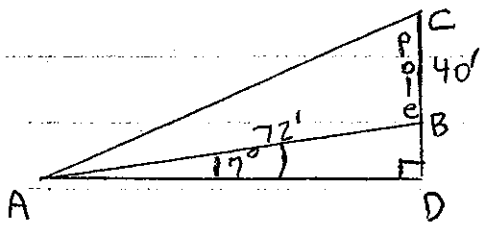
MAC 1114 EXAM III MR. NADEL SPRING 2011

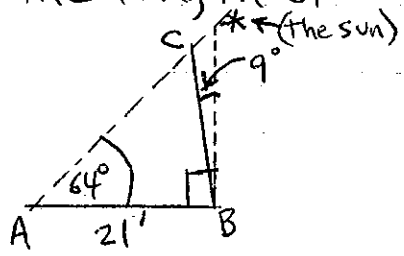
(10)① Solve for the missing parts of this triangle, if A is <u>obtuse</u> (bigger than 90°)
$a = 12.4$, $b = 8.7$, $B = 36.7°$

(10)② A vertical pole 40 ft. tall stands on a hillside making an angle of 17° with the horizontal. Find the length of a cable from the top of the pole to a point 72 ft. downhill from the base of the pole.



(10)③ If $a = 9$, $b = 7$, $c = 4$, find A, B, C to the nearest degree.

(10)④ When the angle of elevation of the sun is 64°, a telephone pole that is tilted at an angle of 9° directly away from the sun casts a shadow 21 feet long on level ground. Find the length of the pole.



(10)⑤a) Convert $(5, 240°)$ to rectangular form. (Give <u>exact</u> values.) Show work.

b) Convert $(-2.13, -4.72)$ to polar form with $r > 0$ and $0° < \theta < 360°$. Show work.

(10)⑥a) Change the equation $r = \cos\theta$ to rectangular form. Show work.

b) Change $2x + 5y = 8$ to polar form.

(20)⑦ Sketch the following: Show Key values and angles.

a) $r = 2\sin\theta$

b) $r^2 = 4\cos 2\theta$

c) $r = 1 - \cos\theta$

d) $r = 2\sin 3\theta$

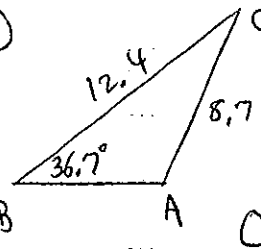
(20)⑧a) Let $\vec{u} = 2i - 3j$, $\vec{v} = 3i + 4j$.
Find $3\vec{u} - 2\vec{v}$. Simplify.

b) Find a <u>unit</u> vector $\vec{u}$ with the same direction as $\vec{v} = \langle 4, -1 \rangle = 4i - j$

c) If $A = (2, -1)$ and $B = (-1, -3)$, represent $\overrightarrow{AB}$ in the form $xi + yj$.

d) If $\|\vec{v}\| = 5$, write the vector $\vec{v}$ in the form $ai + bj$ if the angle it makes with the positive x axis is 120°.

MAC 1114 EXAM III KEY (SP '11)

① 

$\frac{\sin A}{12.4} = \frac{\sin 36.7}{8.7}$

$\Rightarrow A = 180° - 58.4° = 121.6°$

$C = 180° - 121.6 - 36.7°$

$= 21.7°$

$\frac{c}{\sin 21.7°} = \frac{8.7}{\sin 36.7°}$

$\Rightarrow c \approx 5.38$

② $\angle ABD = 90° - 17° = 73°$

$\angle ABC = 180° - 73° = 107°$

$(AC)^2 = 72^2 + 40^2 - 2(72)(40)\cos 107°$

$AC \approx 92$ ft.

③ $a = 9,\ b = 7,\ c = 4$

$\cos A = \frac{b^2 + c^2 - a^2}{(2bc)}$ etc.

We get $A = 107°,\ B = 48°,\ C = 25°$.

④ In triangle ABC,

$B = 90° - 9° = 81°$

So $C = 180° - 64° - 81° = 35°$

a = length of pole

$\frac{a}{\sin 64°} = \frac{21}{\sin 35°}$

$\Rightarrow a = 32.9'$ or $33'$

⑤a) $x = 5\cos 240° = 5\left(-\frac{1}{2}\right) = -\frac{5}{2}$

$y = 5\sin 240° = 5\left(-\frac{\sqrt{3}}{2}\right) = -\frac{5\sqrt{3}}{2}$

b) $r^2 = (-2.13)^2 + (-4.72)^2$ $\left(-\frac{5}{2}, -\frac{5\sqrt{3}}{2}\right)$

$r = 5.18$ $\tan\theta = \frac{4.72}{2.13}$

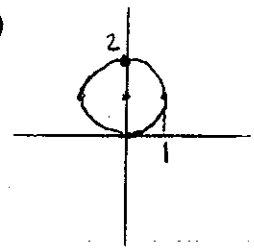
Ans. $(5.18, 245.7°)$

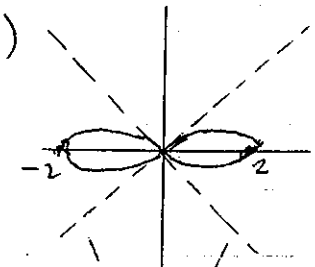
α = ref. angle $= 65.7° \rightarrow \theta = 245.7°$

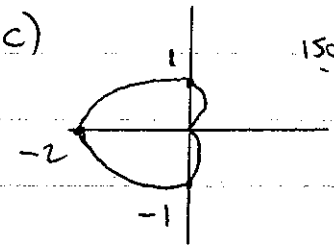
⑥a) $r = \cos\theta$

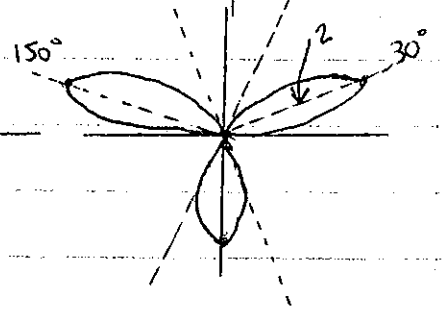
$r^2 = r\cos\theta \Rightarrow x^2 + y^2 = x$

b) $2(r\cos\theta) + 5(r\sin\theta) = 8$

⑦a) 

b) 

c) 



⑧a) $3(2i - 3j) - 2(3i + 4j)$

$= 6i - 9j - 6i - 8j = -17j$

b) $\frac{\langle 4, -1\rangle}{\sqrt{17}} = \left\langle \frac{4}{\sqrt{17}}, \frac{-1}{\sqrt{17}} \right\rangle$

c) Find $B - A$

$\vec{AB} = \langle -1 - 2, -3 - (-1)\rangle$

$= \langle -3, -2\rangle$

$= -3i - 2j$

d) $5\left((\cos 120°)i + (\sin 120°)j\right)$

$= 5\left(-\frac{1}{2}i + \frac{\sqrt{3}}{2}j\right)$

$= -\frac{5}{2}i + \frac{5\sqrt{3}}{2}j$