


Problem 1

- Convert $(-4, 135^\circ)$ to rectangular coordinates (NO CALC!).

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$$\begin{aligned}
 X &= -4 \cdot \cos 135^\circ \\
 X &= -4 \cdot \frac{-\sqrt{2}}{2} = 2\sqrt{2} \\
 Y &= -4 \cdot \sin 135^\circ \\
 Y &= -4 \cdot \frac{\sqrt{2}}{2} = -2\sqrt{2}
 \end{aligned}$$


$$\boxed{(2\sqrt{2}, -2\sqrt{2})}$$

Problem 2

- Write the equation of a limaçon with an inner loop lying on the negative y-axis with x-intercepts of 2 and -2 and y-intercepts of 0, -2, and -6.

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$$\boxed{r = 2 - 4 \sin \theta}$$

Problem 3

Given the parametric equations:

$$x = 3t - 4$$

$$y = t + 2$$

Eliminate the parameter.

Problem 3

$$x = 3t - 4$$

$$y = t + 2$$

$$X = 3T - 4 \quad \text{and} \quad Y = T + 2$$

Solve for T in the y-equation to get

$$T = Y - 2$$

Substitute into X

$$X = 3(Y - 2) - 4$$

$$X = 3Y - 6 - 4$$

$$X = 3Y - 10$$

ANSWER IS

$$y = \frac{1}{3}x + \frac{10}{3}$$

Problem 4

- If a vector has a magnitude of 7 and a direction angle of 137 degrees, find the component form of the vector (round to hundredths).

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$$= \langle 7 \cos 137^\circ, 7 \sin 137^\circ \rangle$$

$$= \langle -5.12, 4.77 \rangle$$

Problem 5

- A baseball is hit from a height of 3 feet off the ground with an initial velocity of 140 feet per second and at an angle of 21 degrees with the ground. Assuming there is no wind, will the ball clear a fence that is 23 feet high and is 360 feet away?
- Set up the equations for the path of the ball and the fence (but do not solve).

Problem 5

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Plot1 Plot2 Plot3
X1T=140Tcos(21)
Y1T=-16T^2+140Ts
in(21)+3
X2T=360
Y2T=23-23T
X3T=

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```

WINDOW
Tmin=
Tmax=5
Tstep=.1
Xmin=0
Xmax=400
Xsc1=40
Ymin=0

```

```

WINDOW
Tstep=.1
Xmin=0
Xmax=400
Xsc1=40
Ymin=0
Ymax=75
Ysc1=75

```

Problem 6

- Find the parameterization of a line segment with endpoints at (1, -2) and (-2, 4).

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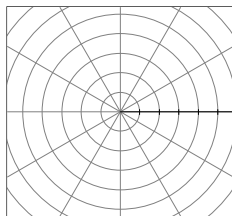
$$X_T = 1 - 3T$$

$$Y_T = -2 + 6T$$

$$T : [0, 1]$$

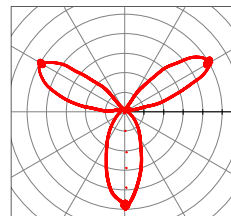
Problem 7

- Graph the following: $r = 5 \sin(3\theta)$



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3 petals
length = 5
spacing $\frac{360}{3}$
 $= 120$
start $= \frac{90}{3} = 30$

Problem 8

- Convert to trigonometric form (NO CALC):

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

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- Convert to trigonometric form:

$$2 - 2i\sqrt{3} = 4 \left(\cos \frac{5\pi}{3} + i \sin \frac{5\pi}{3} \right)$$

$r = 4$
 $\theta = -60^\circ = \frac{5\pi}{3}$

Problem 9

- Use DeMoivre's Theorem to evaluate (NO CALC):

$$(1 + i)^4$$

Problem 9

- Use DeMoivre's Theorem to evaluate (NO CALC):

$$\begin{aligned} (1 + i)^4 &= \left(\sqrt{2} \left(\cos \frac{\pi}{4} + i \sin \frac{\pi}{4} \right) \right)^4 \\ &= (\sqrt{2})^4 \left(\cos \frac{4\pi}{4} + i \sin \frac{4\pi}{4} \right) \\ &= 4(-1 + i(0)) \\ &= \boxed{-4} \end{aligned}$$