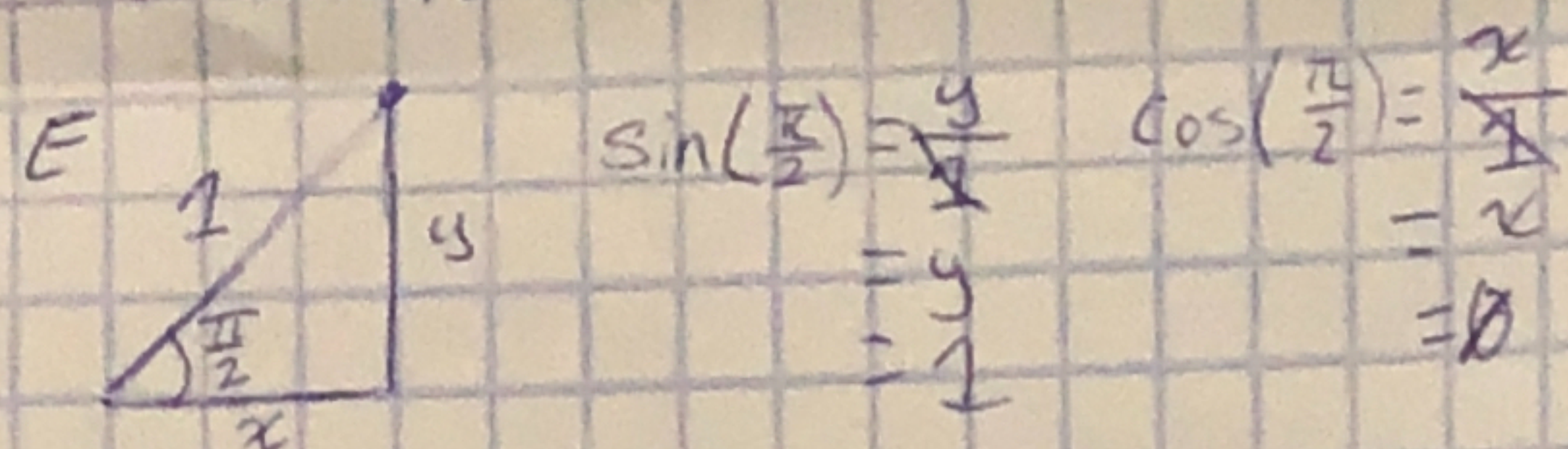


$$55 \quad E = (1, \frac{\pi}{2}) \quad F = (-2, \frac{\pi}{4}) \quad G = (3, \frac{5\pi}{3})$$

$$H = (2, -\frac{13\pi}{12}) \quad \text{Solution}$$

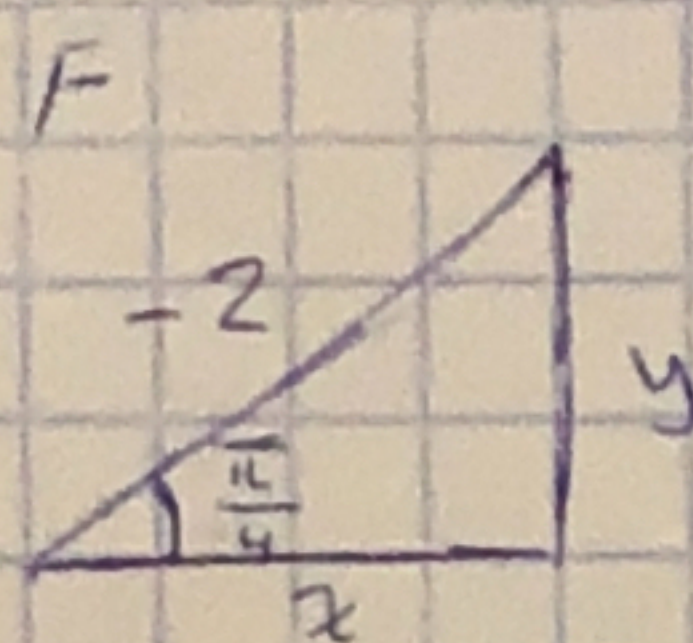


$$\sin(\frac{\pi}{2}) = \frac{y}{1} \quad \cos(\frac{\pi}{2}) = \frac{x}{1}$$

$$= y \quad = x$$

$$= 1 \quad = 0$$

$$E = \text{Polar}(1, \frac{\pi}{2}) = (1, 0)$$



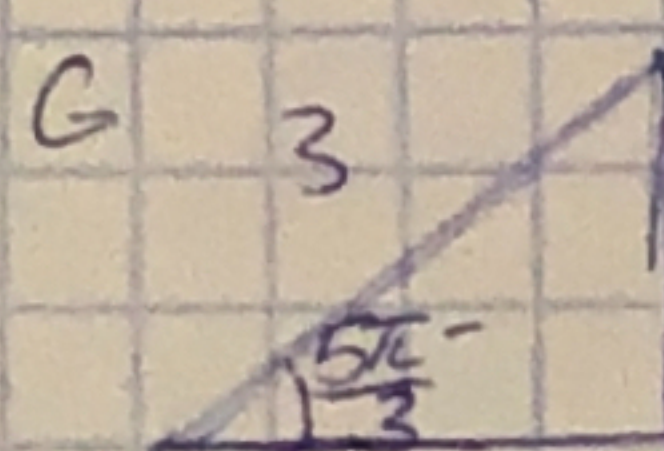
$$-2\sin(\frac{\pi}{4}) = y$$

$$= -\sqrt{2}$$

$$-2\cos(\frac{\pi}{4}) = x$$

$$= -\sqrt{2}$$

$$F = \text{P}(-2, \frac{\pi}{4}) = (-\sqrt{2}, -\sqrt{2})$$



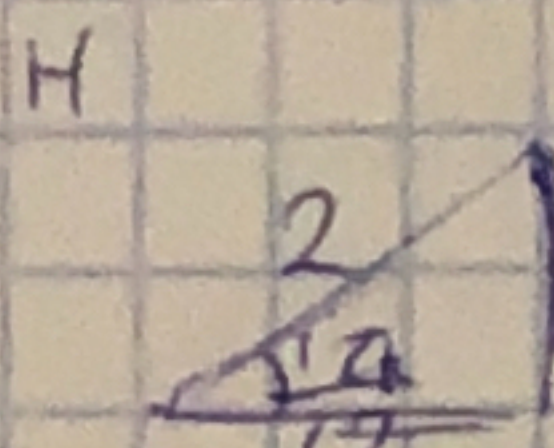
$$3\sin(\frac{5\pi}{3}) = y$$

$$= \sqrt{27}/4$$

$$3\cos(\frac{5\pi}{3}) = x$$

$$= 3/2$$

$$G = (3, \frac{5\pi}{3}) = (\frac{\sqrt{27}}{2}, \frac{3}{2})$$



$$2\sin(\frac{13\pi}{12}) = y$$

$$2\sin(\frac{\pi}{12} + \frac{\pi}{2}) = y$$

$$2\sin(\frac{\pi}{3} + \frac{\pi}{4}) = y$$

$$= 2(\sin(\frac{\pi}{3})\cos(\frac{\pi}{4}) + \cos(\frac{\pi}{3})\sin(\frac{\pi}{4})) = y$$

$$= 2(\frac{\sqrt{3}}{2}(\frac{\sqrt{2}}{2}) + \frac{1}{2}(\frac{\sqrt{2}}{2}))$$

$$= 2(\frac{\sqrt{3}}{2})(\frac{\sqrt{2}}{2}) + \frac{\sqrt{2}}{2}$$

$$= \frac{\sqrt{3} \cdot \sqrt{2}}{2} + \frac{\sqrt{2}}{2} = \frac{\sqrt{3}\sqrt{2} + \sqrt{2}}{2}$$

$$= \frac{\sqrt{6} + \sqrt{2}}{2}$$

56 You can convert between Cartesian and Polar using trigonometry or special triangles.

57 a. $\cos\theta = \frac{\text{adj}}{\text{hyp}}$ which, in this case, the hypotenuse is the radius of the circle and the adjacent is the x value.

b. If $\sin\theta = \frac{\text{opp}}{\text{hyp}}$ then $\sin\theta = \frac{y}{r}$ or, $r\sin\theta = y$.

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

$$d. \theta = \tan^{-1}(\frac{y}{x})$$

58 because $9r\cos\theta + 7r\sin\theta = 5$ is, essentially the same thing as $9x + 7y = 5$, just using our definitions from 57.

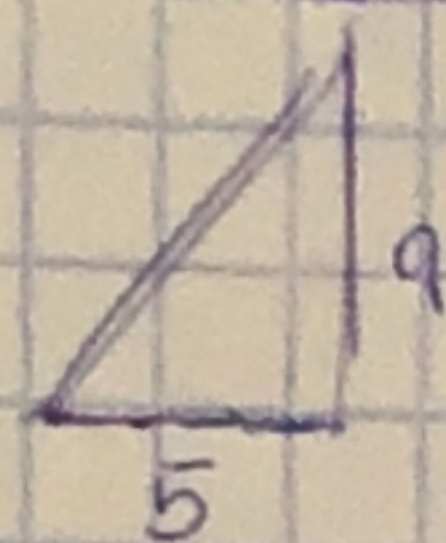
$$59 a. r\sin\theta = -2r\cos\theta + 3$$

$$r\sin\theta + 2r\cos\theta = 3$$

$$b. r\sin\theta = r\cos\theta^2$$

$$c. r\sin\theta^2 + r\cos\theta^2 = 2r\cos\theta^3$$

65 a.



$$r^2 = 9^2 + 5^2$$

$$= 81 + 25$$

$$r^2 = 106$$

$$r = \sqrt{106}$$

$$\begin{array}{r} 81 \\ + 25 \\ \hline 106 \end{array}$$

Question 95

a. $(2-3i) + (3+4i)$

$2-3i+3+4i$

$5+i$

b. $(2-3i) - (3+4i)$

$1-7i$

$0,0$ $3,4$

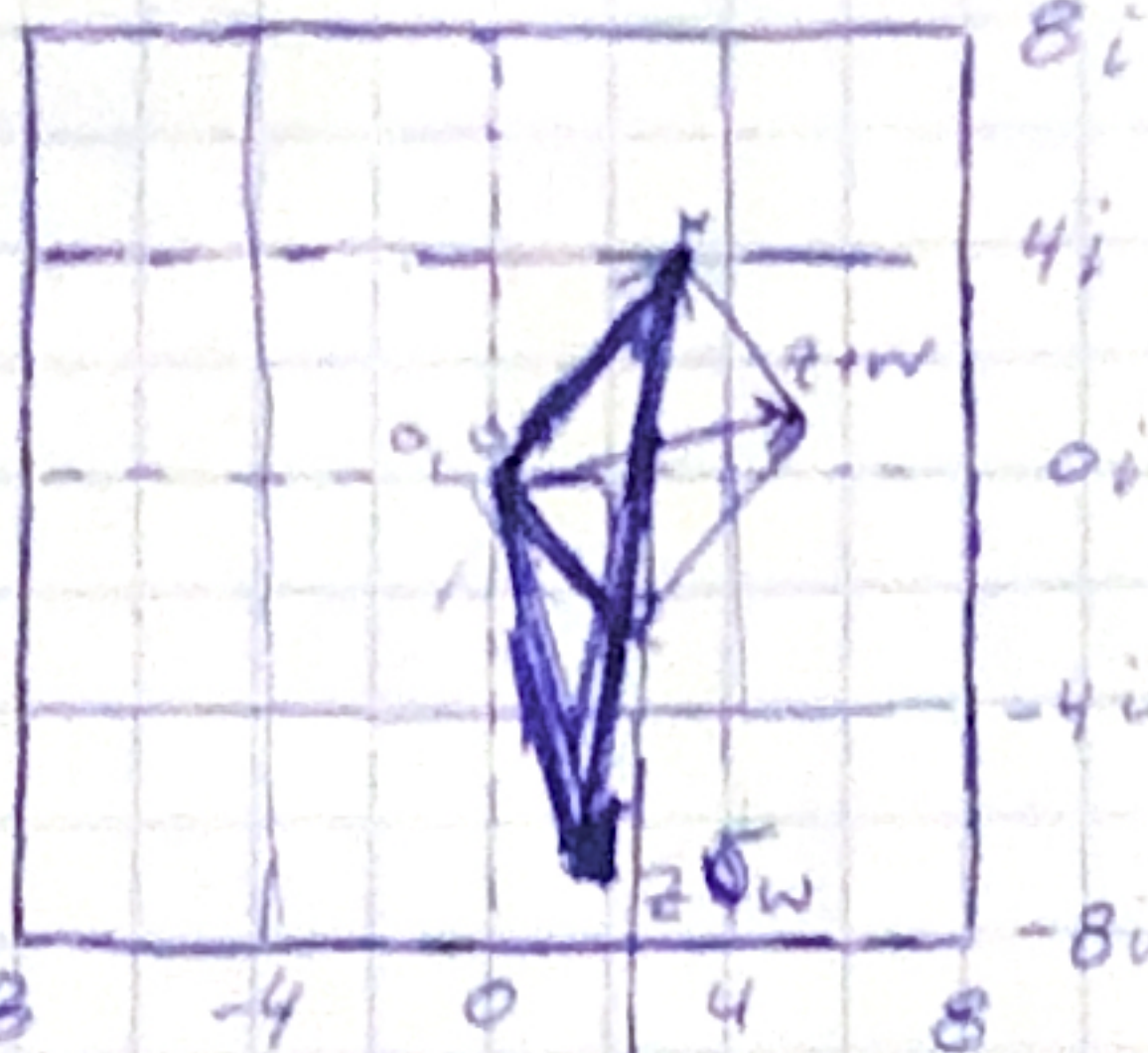
$\frac{4}{3}$

$2,3$ $5,1$

$\frac{4}{3}$

$\frac{4-3}{3-2} = \frac{1}{1}$

$\frac{4+3}{3-2} = \frac{7}{1}$

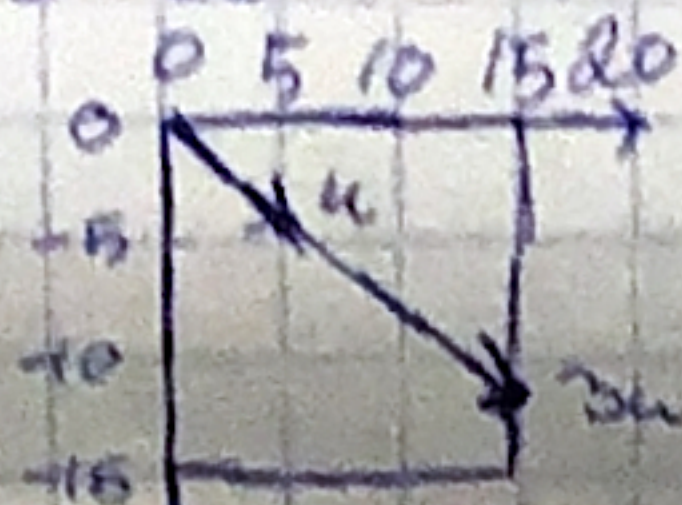


Because this is a parallelogram the lines should be parallel. This means we should be able to check their slope.

Question 96

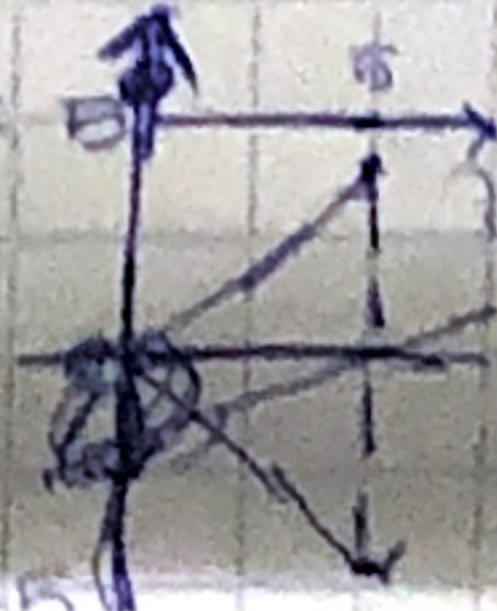
a. $3(5-4i) = 15-12i$

b. They have the same slope.



d. $i(5-4i) = 5i-4(-1) = 5i+4 = 4+5i$

e. They're reflections.



Question 97

a. $(5-4i)(3+2i)$

$= 15+10i-12i-8(-1)$

$= 15-2i+8$

$= 23-2i$

b. the distributive property

Question 98

They are scaled by a factor of the other

Question 99

a. negative conjugates:

$(3+2i)(3-2i)$

$= 9-6i+6i-4(-1)$

$= 9+(-4)$

$= 9-4$

$= 5$

b. $(a+bi)(a-bi)$

$= a^2+abi+abi+(bi)^2$

$= a^2+2abi+(bi)^2$

$= a^2+2abi-2abi$

$= a^2-2abi+2abi$

$= a^2-b^2(-1)$

$= a^2+b^2$

$= (a+b)^2$

Question 100

a. $(4+3i)(2-4i)$
 $8-16i+6i-8(-1)$
 $8-10i+8$
 $16-10i$

b. $(4-2i)(3+4i)$
 $12+16i-6i-8(-1)$
 $12+10i+8$
 $20+10i$
 $10(2+i)$

c. $(3-5i)^2$
 $(3-5i)(3-5i)$
 $9-15i-15i+25(-1)$
 $9-30i-25$
 $-16-30i$
 $2(-8-15i)$

$\frac{1+i}{1-i} \times \frac{1+i}{1+i}$
 $\frac{(1+i)^2}{1-i^2}$

d. $\frac{1+i}{1-i} \times \frac{1-i}{1-i} =$
 $\frac{(1+i)(1-i)}{1-i^2}$
 $\frac{1-i^2}{1-(-1)}$
 $\frac{1+1}{2}$

Question 101

a. $(6, \frac{7\pi}{4}), (6, -\frac{\pi}{4})$

b. $(2, \frac{5\pi}{6}), (2, \frac{\pi}{6})$

10.8
 $2\frac{1}{2}$

$2\frac{1}{2}$
 $2\frac{1}{2}$

$2\frac{1}{2}$

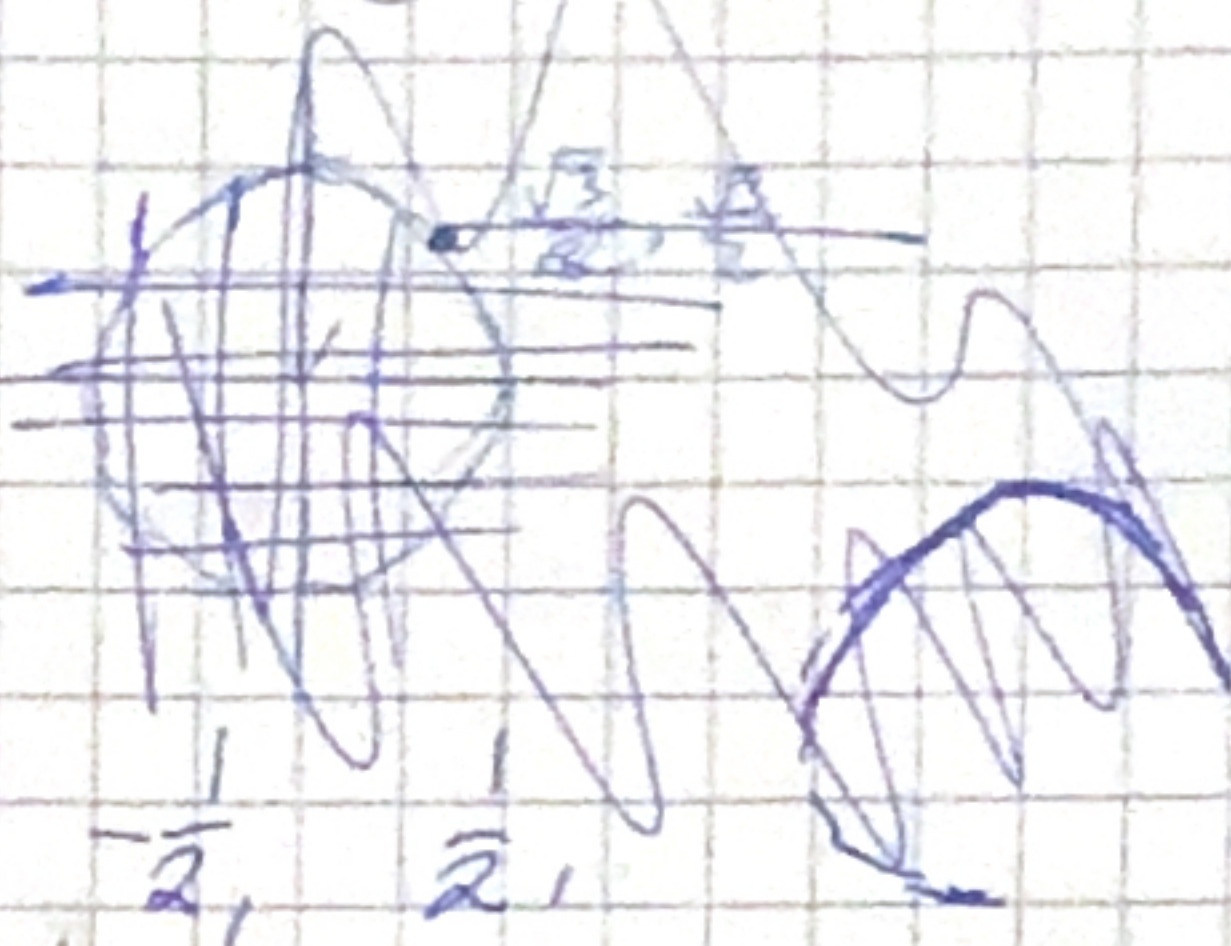
11.55

$$\text{Polar}(r, \theta) = r(\cos \theta, \sin \theta)$$

$$E = \text{Polar}(1, \frac{\pi}{2}) = (0, 1)$$

$$F = \text{Polar}(-2, \frac{\pi}{4}) = (-\sqrt{2}, -\sqrt{2})$$

$$G = (\frac{3\sqrt{2}}{2}, 1.5)$$



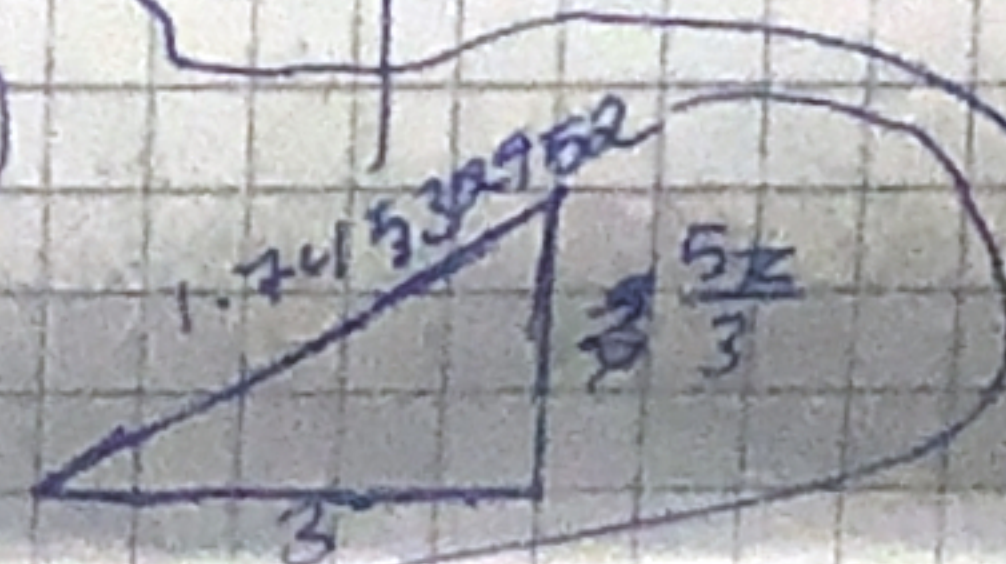
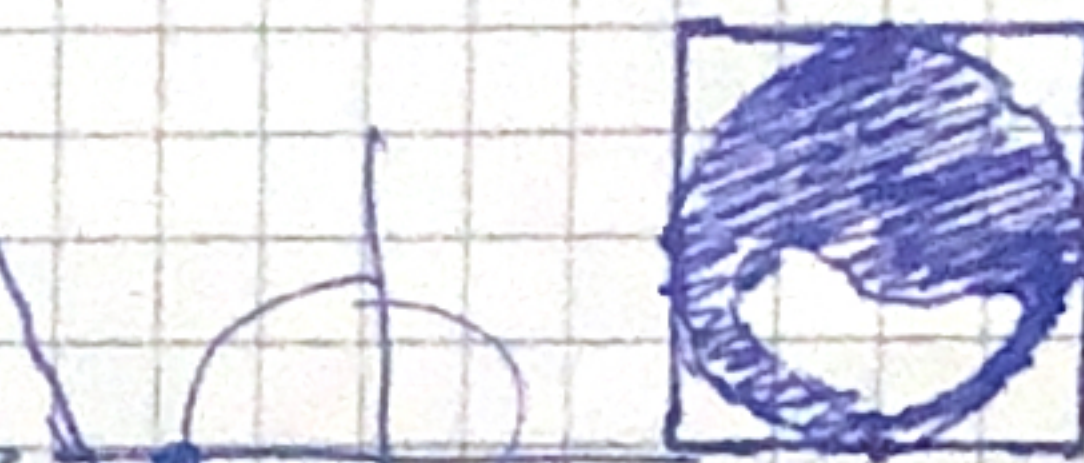
11.56

$$A = (-5, 5) = \text{Polar}(5, \frac{\pi}{2})$$

$$B = (0, -4) = \text{Polar}(-4, 0) \text{ or } (4, \pi)$$

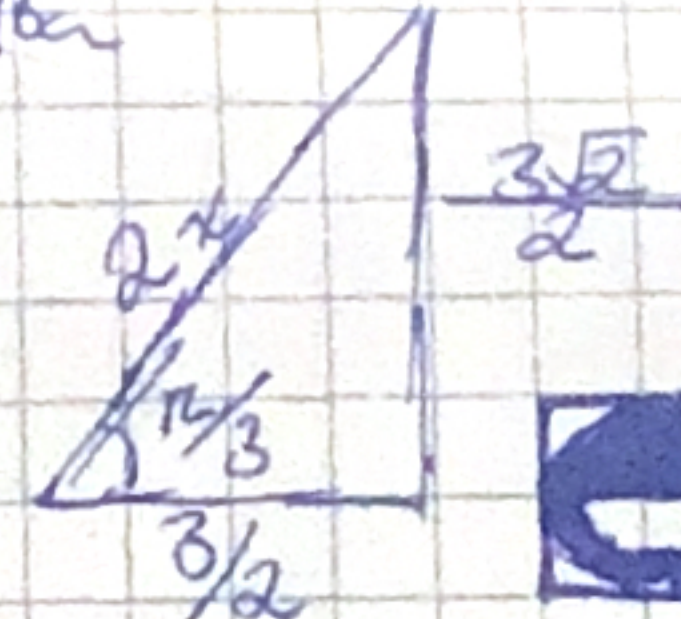
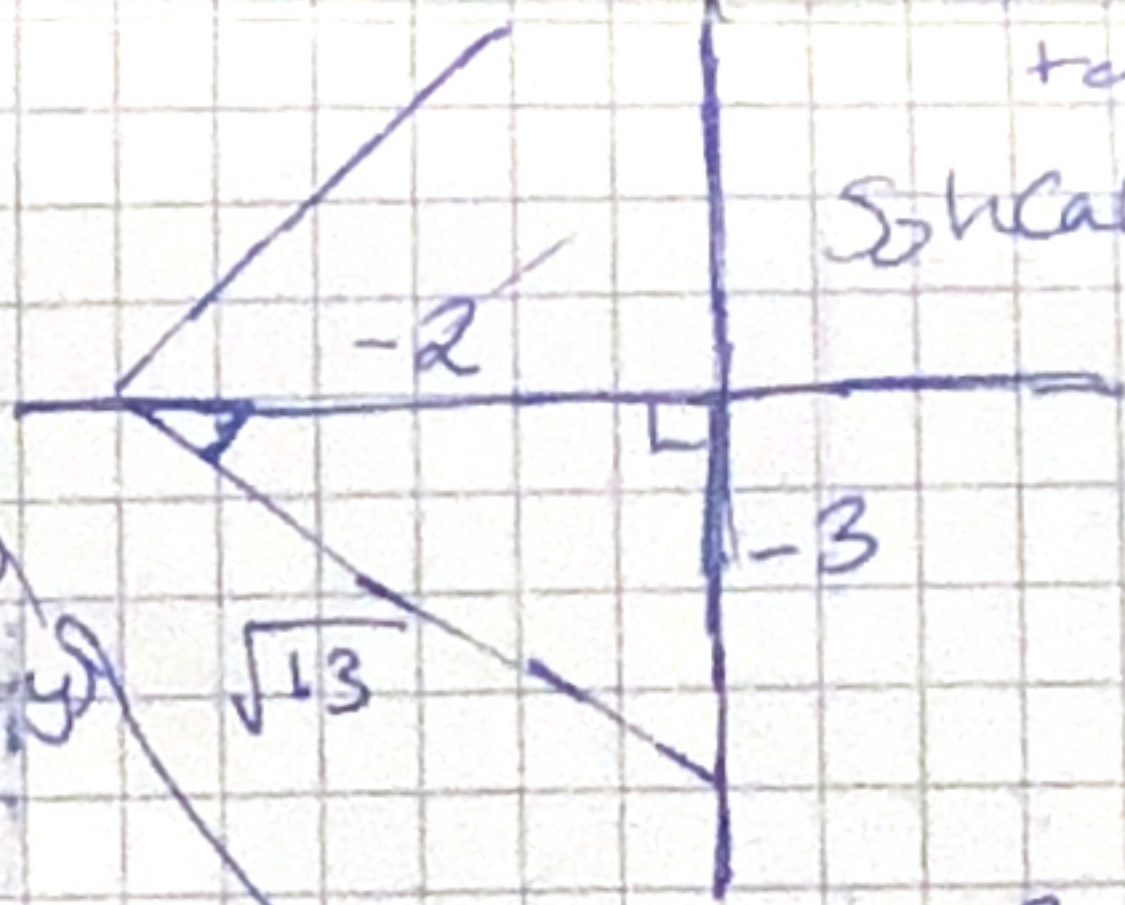
$$C = (\frac{3\sqrt{2}}{2}, \frac{3\sqrt{2}}{2}) = (\frac{3\sqrt{2}}{2}, \frac{3\sqrt{2}}{2}) = (3, \frac{\pi}{3})$$

$$D = (-2, -3)$$



$$\tan^{-1}(\frac{1}{2}) \approx 9.050498143$$

Solution



$$-2^2 - 3^2 = \sqrt{13}$$

$$\tan^{-1}(\frac{\sqrt{13}}{5}) = 9.40982$$

58A

as they multiply both sides to get rid of the denominator.

58B

$$9x + 7y = 5$$

58C

$$5 - 2x = 7y$$

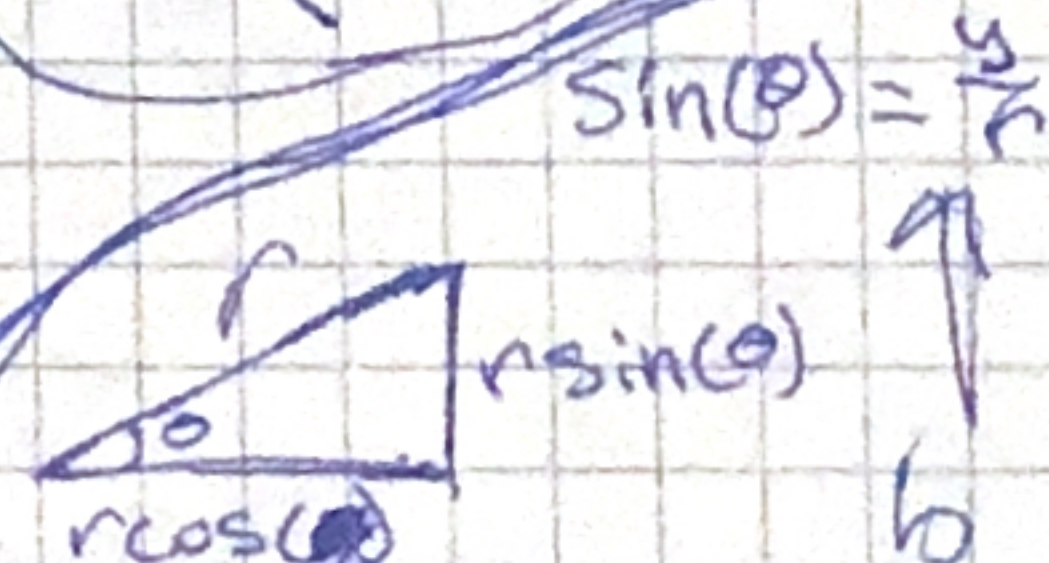
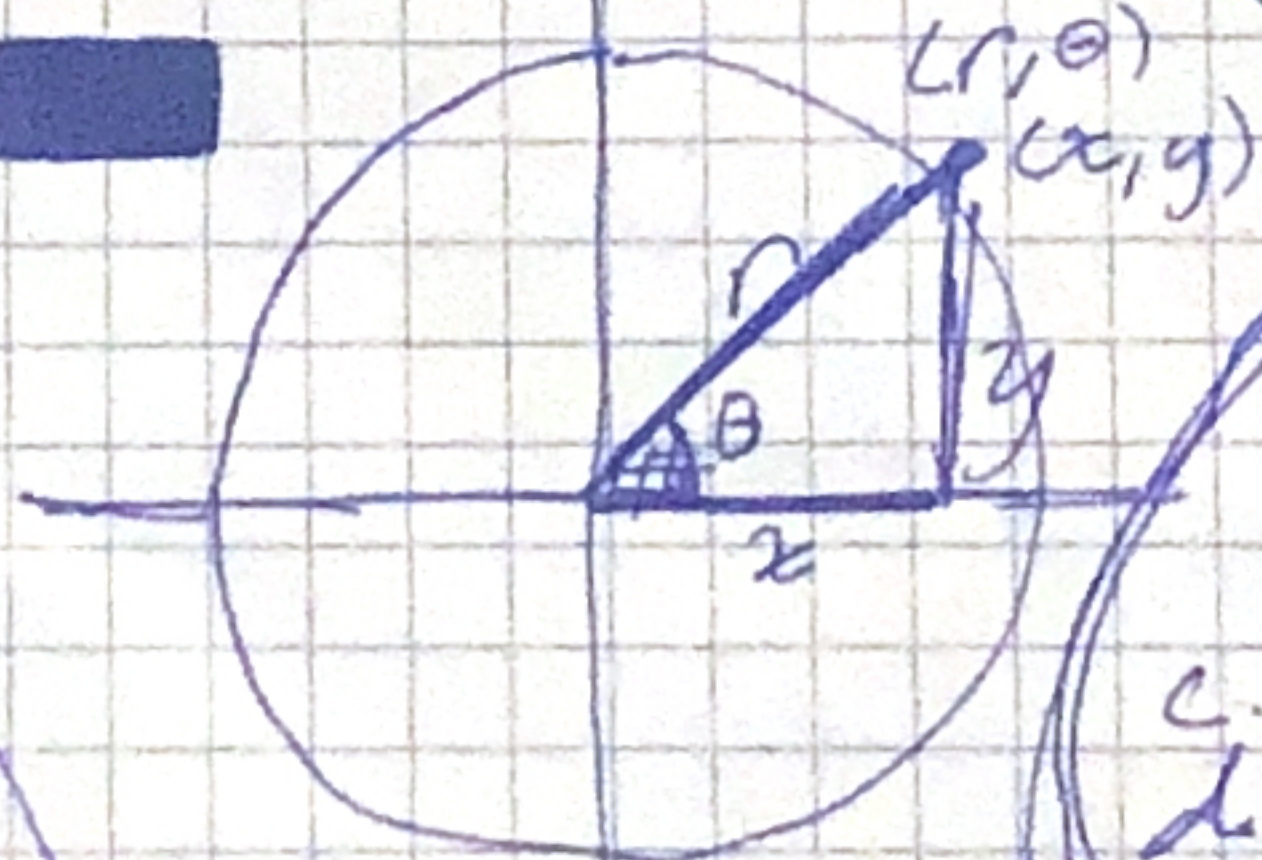
$$6 - 9x = 4$$

58D

$$\text{Slope} = \frac{9}{7}$$

$$y\text{-int} = \frac{5}{7}$$

(r, θ)
 (x, y)



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

$$\theta = \tan^{-1}(\frac{y}{x})$$

Week 10 (pg 1)