

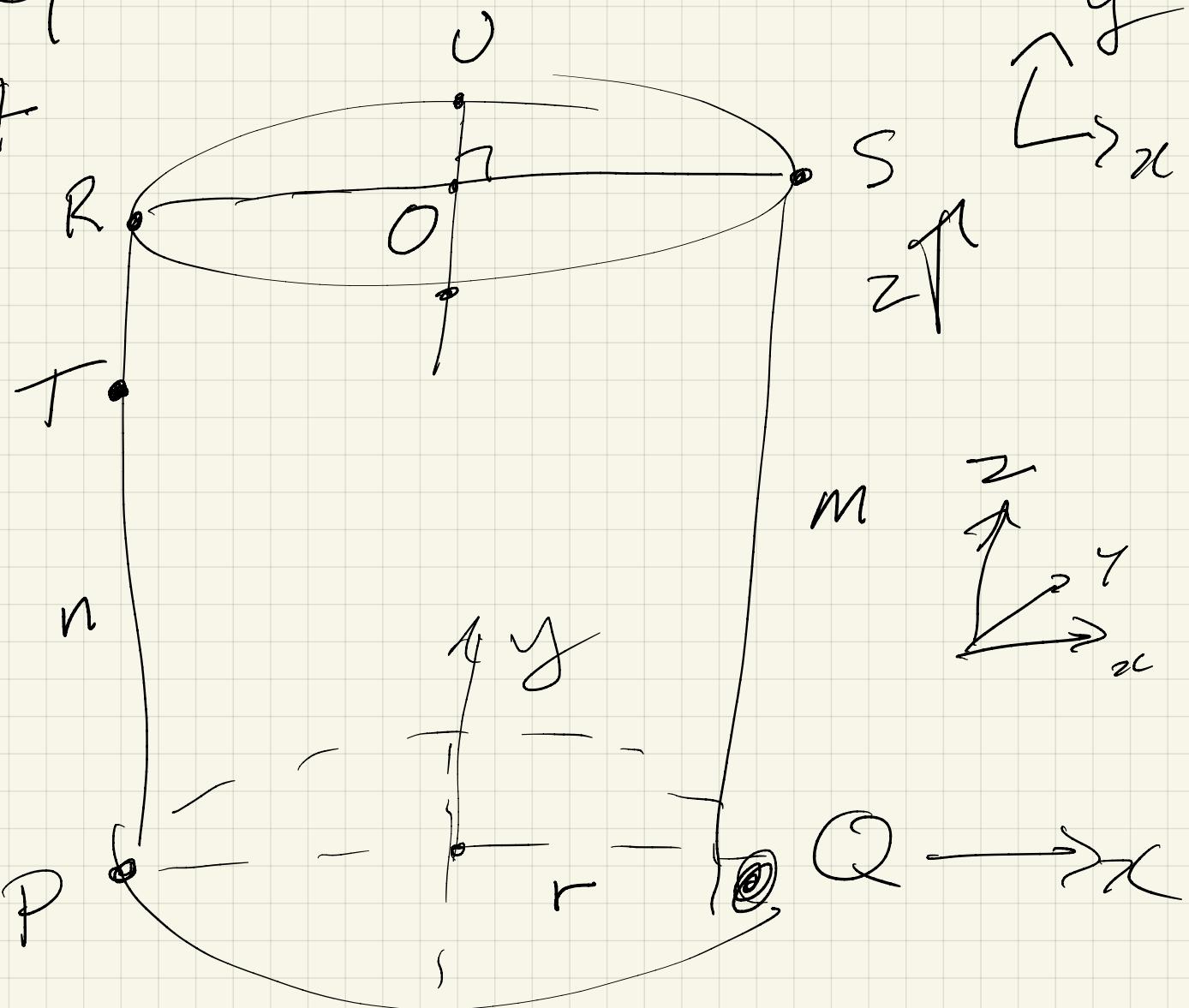
Math With Sean

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2021-05-29



Cayley 2021

#24



$$Q = (r, 0, 0) \quad P = (-r, 0, 0)$$

$$S = (r, 0, m) \quad T = (-r, 0, n)$$

$$U = (0, r, m) \quad QU = 9\sqrt{33}$$

$$QU = \sqrt{r^2 + r^2 + m^2} = \sqrt{2r^2 + m^2} = 9\sqrt{33}$$

$$= |Q - U| \quad \frac{2r^2 + m^2}{UT} = \frac{81 \times 33}{40^2} = 40$$

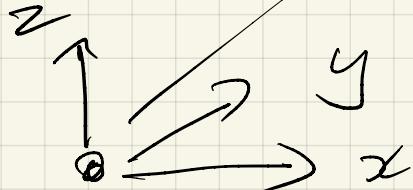
$$A = (x_1, y_1, z_1)$$

$$B = (x_2, y_2, z_2)$$

$$AB = |A - B| = |(x_1 - x_2, y_1 - y_2, z_1 - z_2)|$$

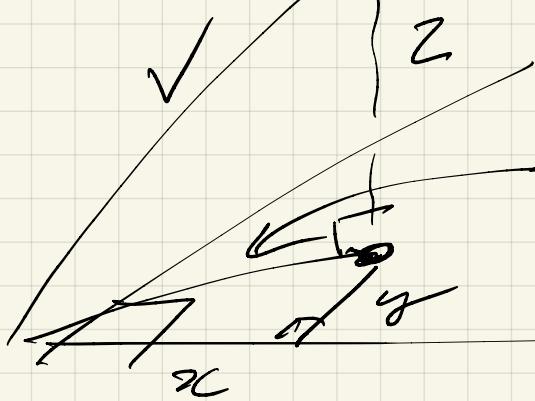
$$= \sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2 + (z_1 - z_2)^2}$$

$$\sqrt{(x, y, z)}$$



$$|V| = \sqrt{x^2 + y^2 + z^2}$$

$$(x, y, z)$$



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

$$v^2 = c^2 + z^2 = x^2 + y^2 + z^2$$

$$|V| = \sqrt{x^2 + y^2 + z^2}$$

3 dimensions

$$V = (x_1, x_2, x_3, \dots, x_n)$$

$$|V| = \sqrt{x_1^2 + x_2^2 + x_3^2 + \dots + x_n^2}$$

$$1) 2r^2 + m^2 = 81 \times 33 = 2673$$

$$2) 2r^2 + (m-n)^2 = 40^2 = 1600$$

$$1-2) m^2 - (m-n)^2 = \frac{81 \times 33 - 40^2}{2}$$

$$m^2 - (m^2 - 2mn + n^2) = 1073$$

$$\cancel{m^2} - \cancel{m^2} + 2mn - n^2 = \frac{1073}{2}$$

$$\underline{(2m-n)n} = 29 \times 37$$

$$m > n$$

factorize 1073

$$\begin{array}{r} 357 \\ 3 \overline{) 1073} \end{array}$$

$$\begin{array}{r} 9 \\ \hline 17 \end{array}$$

$$\begin{array}{r} 15 \\ 23 \\ \hline 21 \end{array}$$

$$\begin{array}{r} 15 \\ \hline 7 \end{array}$$

$$\begin{array}{r} 7 \overline{) 1073} \end{array}$$

$$\begin{array}{r} 7 \\ \hline 37 \end{array}$$

$$\begin{array}{r} 35 \\ \hline 23 \end{array}$$

$$\begin{array}{r} 9 \\ \hline 11 \overline{) 1073} \end{array}$$

$$\begin{array}{r} 99 \\ \hline 83 \end{array}$$

~~1073~~ ~~1073~~ ~~1073~~ ~~1073~~

~~1073~~ ~~1073~~ ~~1073~~ ~~1073~~

$$29 \times 37 = 1073$$

$$n \quad 2m-n$$

$$(2m-n)n = 1073$$

$$m > n$$

$$2m > 2n$$

$$2m-n > n$$

$$13 \overline{) 1073}$$

$$2m-n = 37$$

$$2m = 37+n$$

$$= 37 + 29$$

$$= 66$$

$$m = 33 > 29 = n$$

$\checkmark 3$

$$\sqrt{2r^2 + m^2} = 9\sqrt{33}$$

$$m = 33 \quad n = 29$$

$$2r^2 + m^2 = 81 \cdot 33$$

$$\begin{aligned} 2r^2 &= 81 \cdot 33 - m^2 \\ &= 81 \cdot 33 - 33^2 \end{aligned}$$

$$\begin{aligned} &= (81 - 33) \cdot 33 \\ &= 48 \cdot 33 \end{aligned}$$

$$r^2 = 24 \cdot 33$$

$$r = \sqrt{24 \cdot 33}$$

$$QT^2 = (2r)^2 + n^2 = 4r^2 + n^2$$

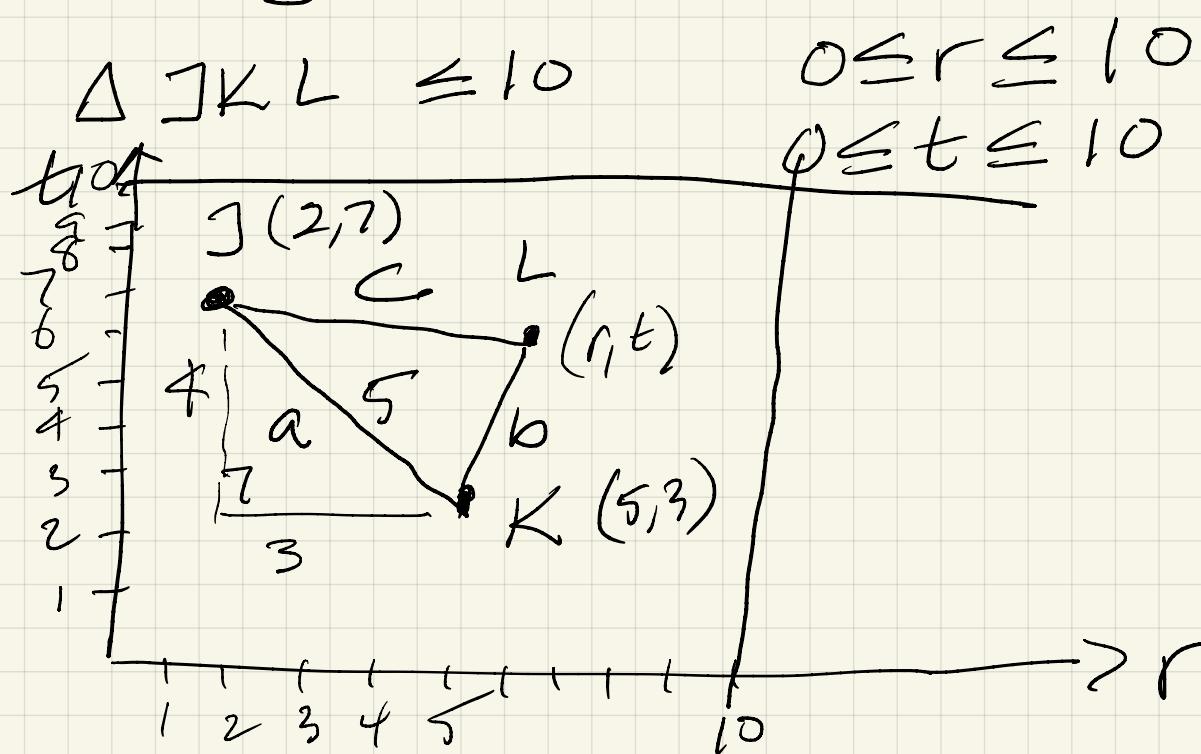
$$Q = (r, 0, 0) \quad P = (-r, 0, 0)$$

$$S = (r, 0, m) \quad T = (-r, 0, n)$$

$$\begin{aligned} QT^2 &= 4r^2 + n^2 = 4 \cdot 24 \cdot 33 + 29^2 \\ &= 3168 + 841 \\ &= 4009 \end{aligned}$$

9 (c)

#25 $J(2,7)$ $K(5,3)$ $L(r,t)$



Heron: $\text{Area} = \sqrt{s(s-a)(s-b)(s-c)}$

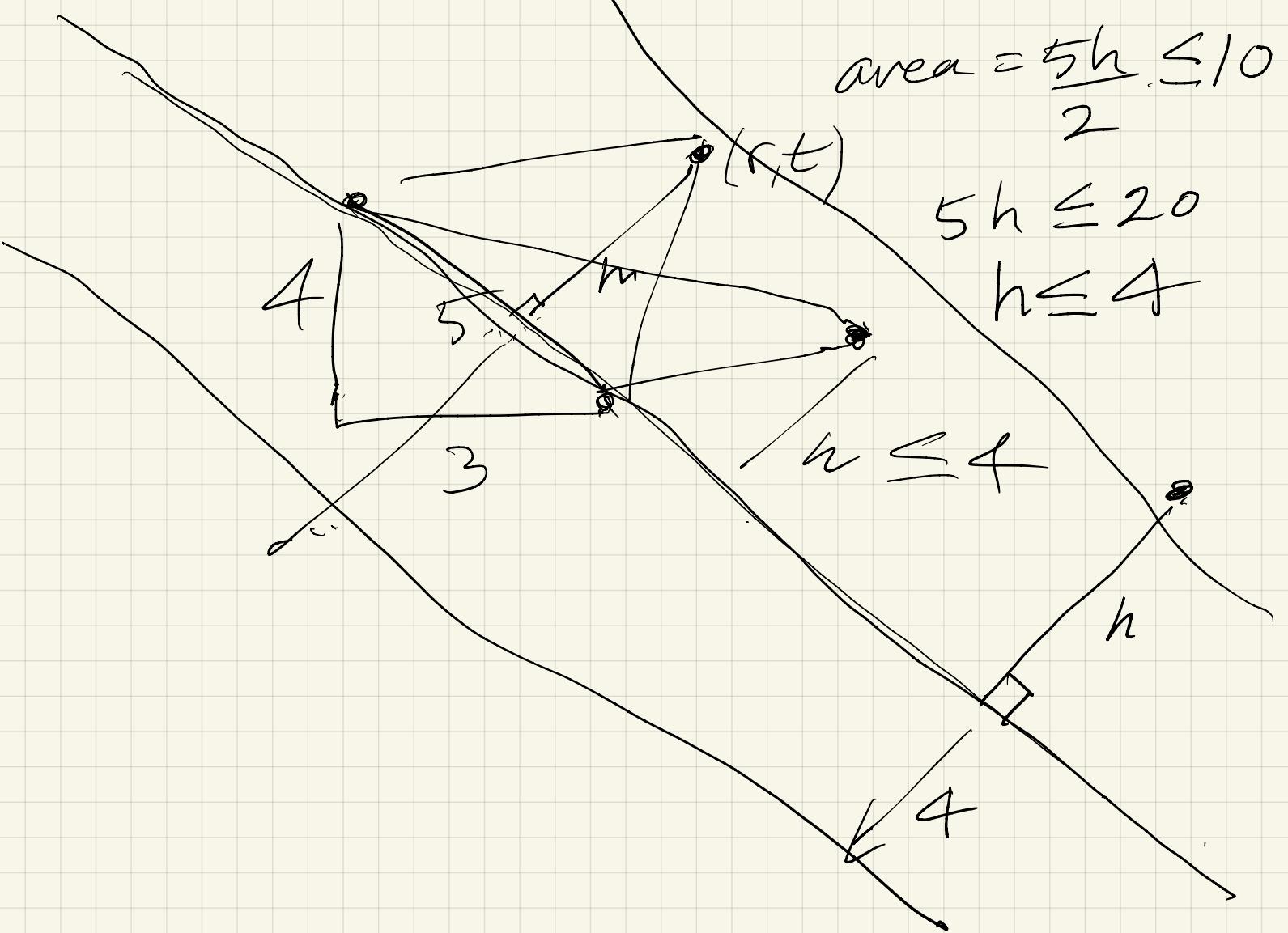
$$s = \frac{a+b+c}{2}$$

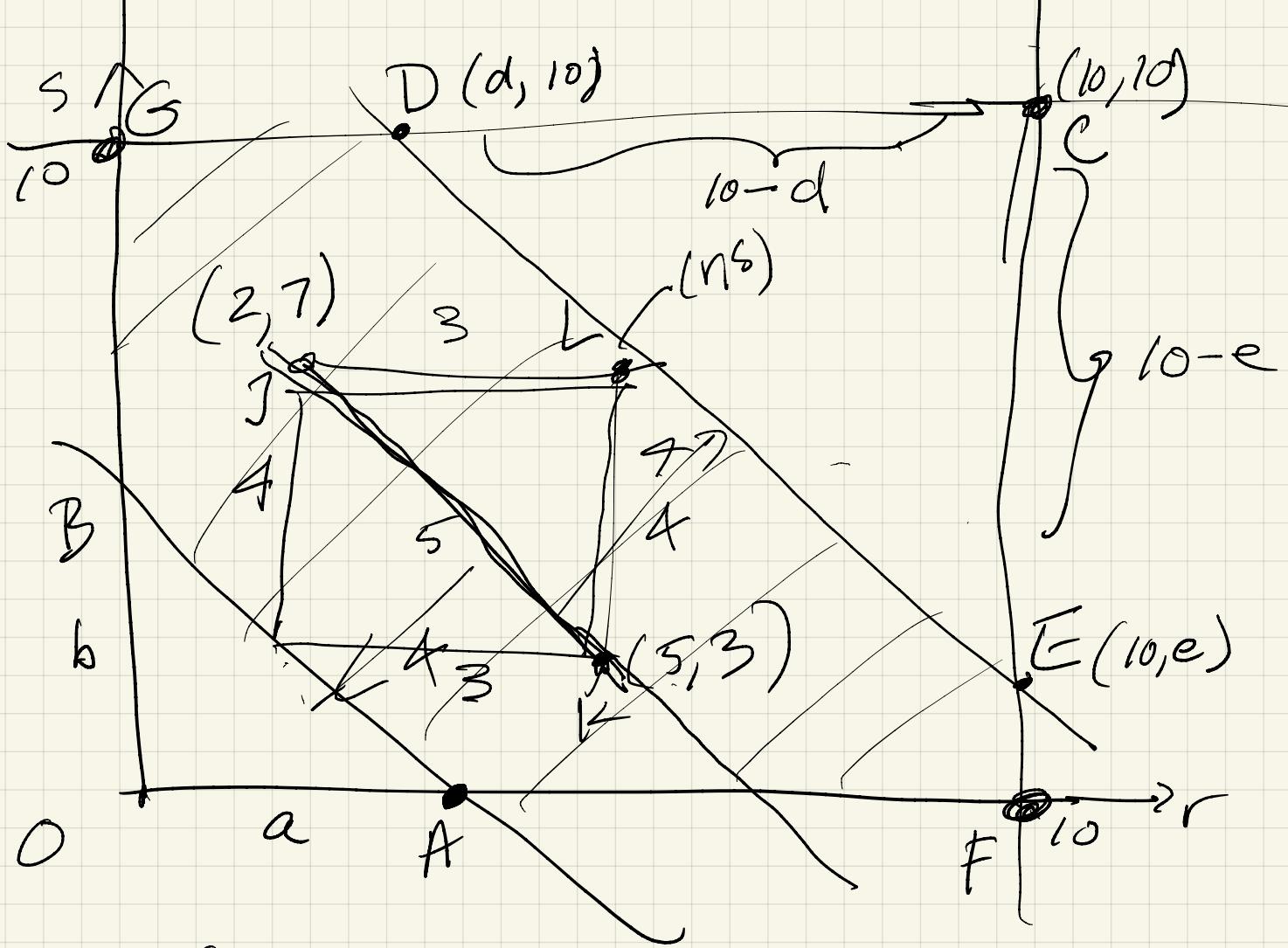
$$a = 5 \quad b = (r-5)^2 + (t-3)^2$$

$$c^2 = (r-2)^2 + (t-7)^2$$

$$\text{Area} \leq 10 \quad \text{Area}^2 \leq 100$$

$$\text{Area}^2 = s(s-a)(s-b)(s-c) \leq 100$$





$$OFCG = 100$$

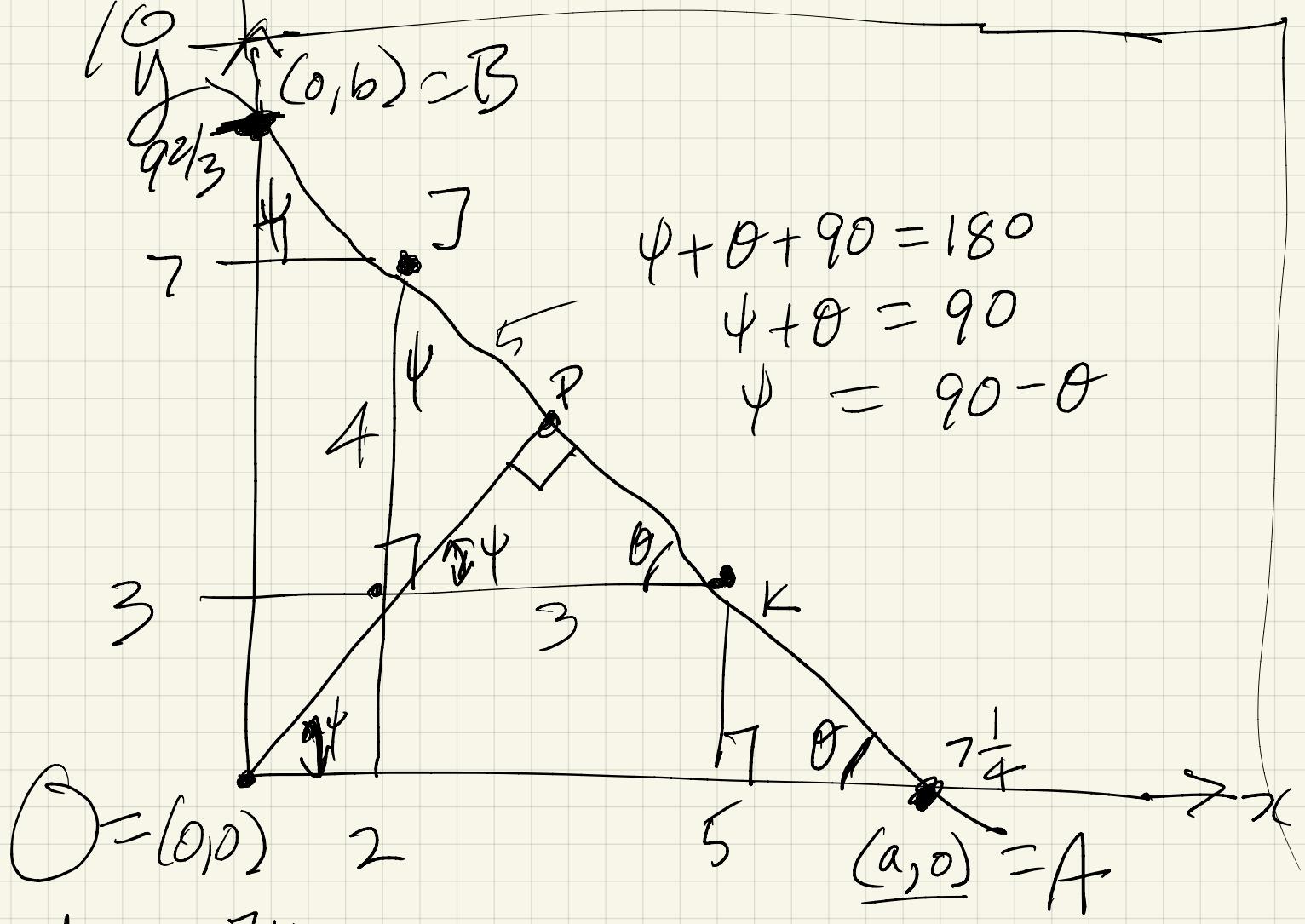
OF CG - 100
Compute AFEDGB = R

$$R = 100 - OAB - ECD$$

Slope of the lines = $-\frac{4}{3}$ raise
run

$$A = (a, 0) \quad B = (0, b)$$

$$b/a = 4/3$$



$$\begin{aligned}\psi + \theta + 90^\circ &= 180^\circ \\ \psi + \theta &= 90^\circ \\ \psi &= 90^\circ - \theta\end{aligned}$$

line JK

$$y = mx + b$$

(J)

$$7 = m \cdot 2 + b$$

(K)

$$3 = m \cdot 5 + b$$

} 2 equations

} 2 variables

$$(J) - (K) \quad 7 - 3 = 2m + b - (5m + b)$$

$$4 = -3m$$

$$m = -\frac{4}{3}$$

$$(J) \quad 7 = -\frac{4}{3} \cdot 2 + b = -\frac{8}{3} + b$$

$$(7) \quad 7 = -\frac{4}{3} \times 2 + b = -\frac{8}{3} + b$$

$$b = 7 + \frac{8}{3}$$

$$= 7 + 2 + \frac{2}{3}$$

$$= 9 + \frac{2}{3} < 10$$

$$y = mx + b$$

$$= -\frac{4}{3}x + 9\frac{2}{3}$$

$$\text{Find } (a, c) \quad 0 = -\frac{4}{3}a + 9\frac{2}{3}$$

$$\frac{4}{3}a = 9\frac{2}{3}$$

$$4a = 3(9\frac{2}{3})$$

$$= 27\frac{6}{3}$$

$$= 29$$

$$a = \frac{29}{4} = 7\frac{1}{4} < 10$$