
Read Me First: *Show all essential work neatly. Use correct notation when presenting your computations. Write using complete sentences. In particular, be very careful when using "=", **equals**, and "⇒", **implies**. Do not "box" your answers. Communicate.*

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1. (15 pts.) Identify each of the following polar equations as completely as possible by transforming each equation to rectangular coordinates. [These are fairly easy!!]

(a) $\theta = -(1/6)\pi$

(b) $2r \cdot \sin(\theta) = 3r \cdot \cos(\theta)$

(c) $r = 3$

(d) $r = 2 \cdot \sin(\theta)$

(e) $r \cdot \cos(\theta) = -4$

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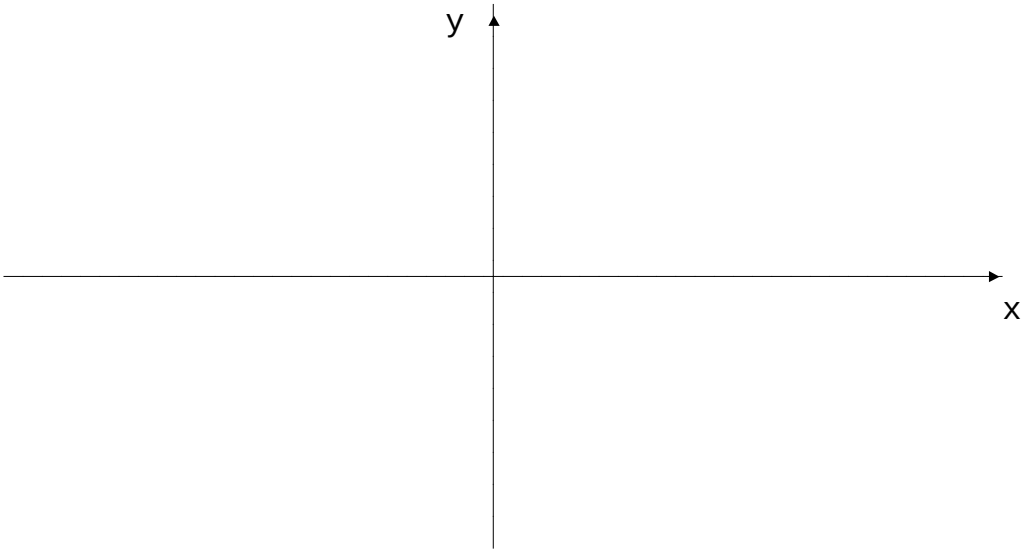
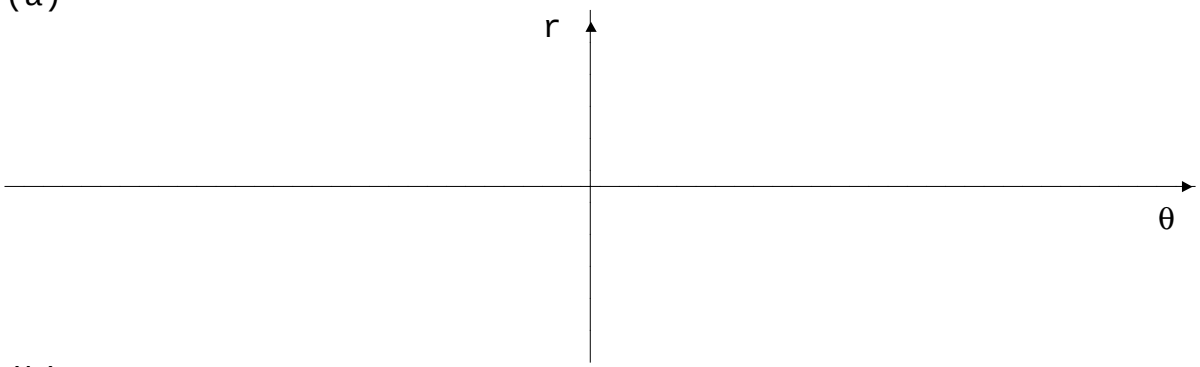
2. (10 pts.) Very carefully sketch the graph of the equation $x^2 = -4y$ below.



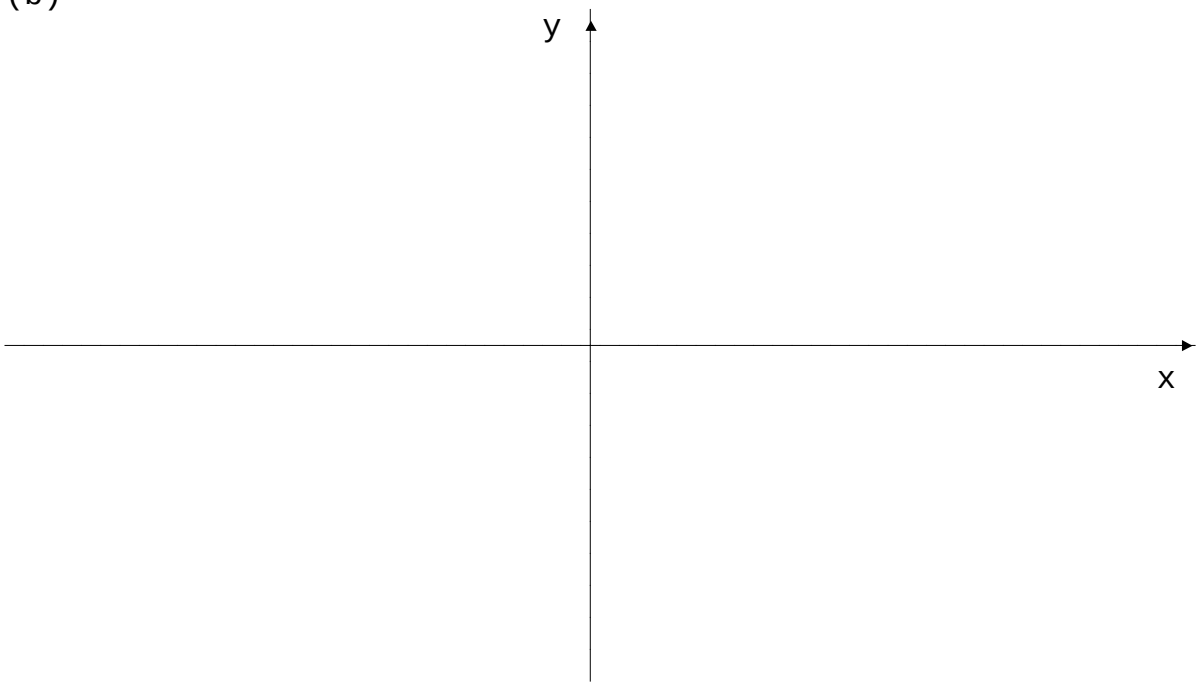
3. (15 pts.) Sketch the given curve in polar coordinates. Do this as follows: (a) Carefully sketch the auxiliary curve, a rectangular graph on the coordinate system provided. (b) Then translate this graph to the polar one.

Equation: $r = 2 \cdot \cos(2\theta)$

(a)



(b)



4. (10 pts.) Write each expression in the standard form a + bi.

(a) $(8 - 5i) + (-9 + 2i) =$

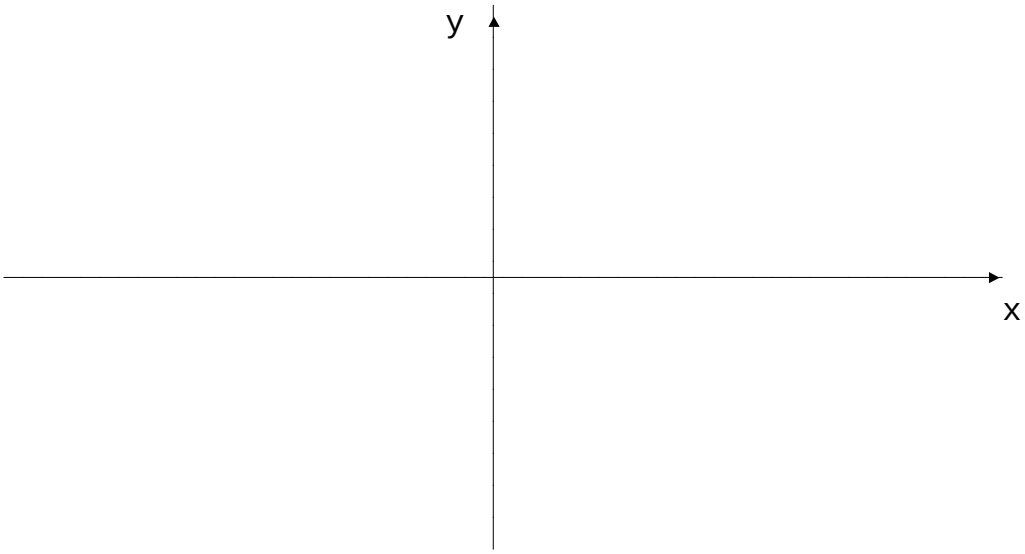
(b) $13/(4 - 3i) =$

(c) $4i^5 - 6i^7 =$

(d) $(2 - 4i) \cdot (-3 + 5i) =$

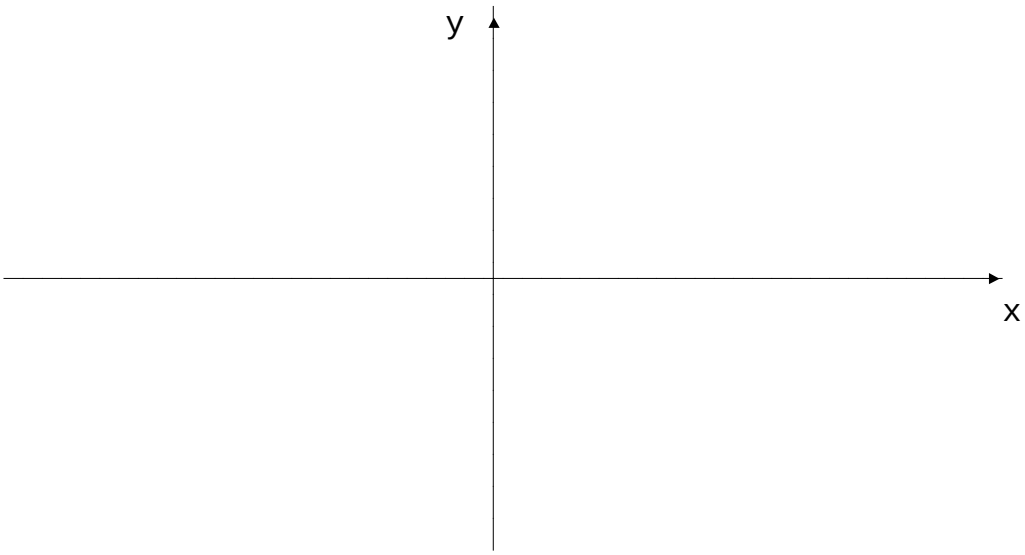
(e) $[2(\cos 30° + i \cdot \sin 30°)]^5 =$

5. (10 pts.) Very carefully sketch the graph of the equation $(1/9)x^2 + (1/4)y^2 = 1$ below.



6. (5 pts.) Solve the following equation in the complex number system: $x^4 - 4 \cdot x^2 - 5 = 0$

7. (10 pts.) Very carefully sketch the graph of the equation $y^2 - x^2 = 1$ below.



8. (10 pts.) Find all the complex cube roots of $3^{1/2} + i$. Leave your answer in polar form with the arguments given in degrees.

9. (5 pts.) Find the vertex, focus, and directrix of the parabola that has the equation given below.

$$y^2 - 4y = x + 4.$$

10. (5 pts.) Find the center, foci, and vertices of the ellipse that has the equation given below.

$$4x^2 + y^2 + 4y = 0.$$

11. (5 pts.) Find the center, foci, and vertices of the hyperbola that has the equation given below.

$$y^2 - 4x^2 - 16x - 2y - 19 = 0$$