

MATH 13, Sec. D02 - College Algebra and Trigonometry, V. I

Review sheet. Professor Luis Fernández

1. A vector \vec{V} has magnitude $|\vec{V}| = 23.5$ and direction $\theta = 108^\circ$. Find the x - and y -components. Round off to the nearest tenth.
2. A vector \vec{A} has magnitude $|\vec{A}| = 12.3\text{ft}$ and direction $\theta = 27^\circ$. Find the x - and y -components. Round off to the nearest tenth.
3. A vector \vec{R} has components $R_x = -13$ and $R_y = 5$. Find the magnitude and the angle of \vec{R} .
4. Find $\vec{A} + \vec{B}$, where $|\vec{A}| = 1653$, $\theta_A = 36^\circ$, $|\vec{B}| = 9807$, $\theta_B = 253^\circ$.
5. Find $\vec{A} + \vec{B}$, where $|\vec{A}| = 16$, $\theta_A = 30^\circ$, $|\vec{B}| = 12$, $\theta_B = 65^\circ$.
6. A jet flew 120 miles due West from Boston, and then 80 miles due North. What is the displacement of the jet from Boston?
7. Simplify the following expression, writing the result in the form $a + bj$.

$$\frac{(6j + 5)(2 - 4j)}{(5 - j)(4j + 1)}.$$

8. Write
 - a) $-22 - 77j$ in polar form and exponential form.
 - b) $20\angle 120^\circ$ in rectangular form and exponential form.
 - c) $2e^{0.25j}$ in rectangular form and polar form.
9. Evaluate and express the answers in the form $a + jb$.
 - a) $\frac{2}{j} + \frac{3 + 4j}{1 - j}$
 - b) $(2 + 4j) - (-j + 3) + (-2j^3)$.
10. Evaluate $(5\angle 35^\circ) \cdot (8\angle 18^\circ) \div (2\angle 100^\circ)$. Express your answer in polar form.
11. Multiply and write the answer in polar form: $(2 - j)(1 + 3j)$.
12. Multiply and write the answer in polar form:

$$2(\cos 135^\circ + j \sin 135^\circ) \cdot 3(\cos 60^\circ + j \sin 60^\circ).$$

13. Find $(1 + 2j)^5$. Express the answer in polar form.
14. Write $\sqrt{3} - 2j$ in exponential form.
15. Let $f(x) = \frac{x}{\sqrt{x-1}}$.
 - a) Find $f(x+1)$.
 - b) Find the domain of f .
16. Find the domain of $g(x) = \sqrt{x-6}$.

17. Given $f(x) = x^2 + 3x$, find
- $f(c - 1)$.
 - $f(-2c)$.
18. Given the function $f(x) = \frac{9 - x^2}{3x}$, find
- $f(-2)$ and $f(x + 1)$.
 - The domain of f .
19. Sketch the graph of $y = 2^x - 4$, showing the coordinates of at least 4 points.
20. Sketch the graph of $y = 2 + \log_2 x$, showing the coordinates of at least 4 points.
21. Solve for x .
- $\text{Ln}(x - 8) + \text{Ln } x = 2 \text{Ln } 3$.
 - $3^{2x-1} = 27$.
22. Solve for y : $\text{Ln } y + 2 \text{Ln } 3 = \text{Ln } 2 + \text{Ln } 5$.
23. Write $\log_2 x + 2 \log_2 3 = 3 \log_2 81$
24. Condense (i.e. write with a single logarithm): $\log_2 5 + 2 \log_2 x - 3 \log_2 y$.
25. Convert:
- 72° to radians.
 - 315° to radians.
 - $\frac{5\pi}{3}$ to degrees.
 - $\frac{3\pi}{5}$ to degrees.
26. For the function $y = -3 \sin\left(2x - \frac{\pi}{2}\right)$, find the amplitude, period and displacement, and sketch one period of its graph. Make sure to mark the important points in the x - and y -axes.
27. Find amplitude, period, and displacement, and sketch one cycle of the graph of $y = -2 \sin(\pi x + \pi)$. Make sure to label the important points in the x - and y -axes.
28. Find amplitude, period, and displacement, and sketch one cycle of the graph of $y = 2 \sin(3x + \pi)$. Make sure to label the important points in the x - and y -axes.
29. Prove the identity $\sin x(\tan x + \cot x) = \sec x$.
30. Prove the identity $2 \tan x \cos^2 x = \sin 2x$
31. Prove the identity $\sin \theta + \cot \theta \cos \theta = \csc \theta$.
32. Prove the identity $\sec x(1 - \sin^2 x) = \cos x$.
33. Prove the identity $\tan x + \cot x = \sec x \csc x$.
34. Solve the equation $3 \cos^2 x + \cos x = 0$, for $0^\circ \leq x < 360^\circ$ (in degrees!).
35. Solve the equation $2 \cos x - 1 = 0$, for $0^\circ \leq x < 360^\circ$ (in degrees!).
36. Solve the equation $\sin x + 1 = 3 \sin x$, for $0^\circ \leq x < 2\pi$ (in radians!).

37. Find the exact value of $\sin(105^\circ)$ using $105^\circ = 60^\circ + 45^\circ$.

38. Find the exact value of $\sin 120^\circ$ by using $120^\circ = 90^\circ + 30^\circ$.

39. Solve the following system of equations using determinants.

$$\begin{cases} 2x - 6y = -3 \\ -6x - 18y = 5 \end{cases}$$

40. Solve the following system of equations using determinants.

$$\begin{cases} x - 3y = -7 \\ -2x + 3y = 5 \end{cases}$$

41. Solve the following system of equations using determinants.

$$\begin{cases} 4x + y = 0 \\ -2x + 2y = 10 \end{cases}$$