

MAT 320 Homework 1

Fall 2024

Due date: Wednesday, Sep 11

In the first ten problems find the Cartesian form of the complex number indicated. Simplify as much as possible but do not use decimals.

1. $(-2 + 3i)^2$
2. $(-2 + 3i)^3$
3. $e^{i\pi/3}$
4. $\cos \frac{\pi}{3} e^{i\pi/4}$
5. $e^{i\pi/3} + e^{-i\pi/3}$
6. $e^{i3\pi/4}$
7. $e^{i3\pi/4} + e^{-i\pi/4}$
8. $\sum_{k=0}^7 e^{ik\pi/8} + \sum_{n=1}^8 e^{-in\pi/8}$
9. $1 + i\frac{\pi}{2} + \frac{(i\frac{\pi}{2})^2}{2!} + \frac{(i\frac{\pi}{2})^3}{3!} + \frac{(i\frac{\pi}{2})^4}{4!} + \frac{(i\frac{\pi}{2})^5}{5!} + \dots$
10. $1 + i\frac{\pi}{2} + (i\frac{\pi}{2})^2 + (i\frac{\pi}{2})^3 + (i\frac{\pi}{2})^4 + (i\frac{\pi}{2})^5$

In the next 10 problems, find a polar form $re^{i\theta}$:

11. $\frac{1}{2} + \frac{\sqrt{3}}{2}i$
12. $1 - \sqrt{3}i$
13. $2i(1 + i)$
14. $(1 + i)^8$
15. $(-1 + i)^8$
16. $1 + e^{i\frac{\pi}{2}} + (e^{i\frac{\pi}{2}})^2$
17. $\cos(-\frac{\pi}{3}) + \sin(\frac{\pi}{3})i$
18. $\cos(-\frac{\pi}{3}) - \sin(\frac{\pi}{3})i$
19. $(\cos(\frac{\pi}{3}) + \sin(\frac{\pi}{3})i)^3$
20. $1 + i\frac{\pi}{2} + \frac{(i\frac{\pi}{2})^2}{2!} + \frac{(i\frac{\pi}{2})^3}{3!} + \frac{(i\frac{\pi}{2})^4}{4!} + \frac{(i\frac{\pi}{2})^5}{5!} + \dots$