Name: ____

Demoivre's Theorem and nth Roots

1) Evaluate each of the following and write in the form a + bi:

a) $\left(2cis6^0\right)^5$

b) $\left(\sqrt{2}cis75^0\right)^4$

c) $(1+i)^8$

d) $(1-i)^6$

e) $\left(\frac{1}{2}-i\frac{\sqrt{3}}{2}\right)^{20}$

f) $\left(\frac{\sqrt{3}}{2}+\frac{1}{2}i\right)^9$

g) $\frac{\left(1-i\sqrt{3}\right)^8}{(-2+2i)^4}$

h) $\frac{(1+i)\left(\sqrt{3}+i\right)^3}{\left(1-i\sqrt{3}\right)^3}$

2) Evaluate $(3-2i)^8$ in the trigonometric form

3) Write in trigonometric form then simplify:

1) $(1+i)^{10}$
2) $\left(-1-i\sqrt{3}\right)^{10}$
3) $(-1-i)^4 \bullet (2+3i)^2$
4) $\left[-2\left(i^{100}-i^3\right)\right]^3$
5) $\frac{(\sqrt{3}+i\sqrt{3})^3(1-i)^2}{(-1-i)^4}$

4) Find all the indicated roots and express the results in the form a + bi:

1) The square roots of i
2) The square roots of $2-2\sqrt{3}i$
3) The cube roots of $27i$
4) The sixth roots of $-\sqrt{3}+i$
5) cube roots of 3 – 4i
6) cube roots of 27i
7) fifth roots of –4 + 4i

5) Find the six distinct solutions of $z^6 = -4-4\sqrt{3}$

6) Find the four solutions of $z^4 = 1 + i$

7) Find the fourth roots of: $z = 4i\sqrt{3}-4$. (Write answers in trigonometric form)

8) Find the fourth roots of $z = -1+3i$

9) Find fourth roots of 16. Leave your answers in standard form

10) Find the 4^{th} roots of : z = -4 + 3i

11) Evaluate $[4i^2\sqrt{3} - 4i^3]^{1/3}$. Write all your answers in trigonometric form

12) Solve:

1) $x^2 - [2(\cos 25° + i\sin 25°)]^2 = 0$
2) $x^4 - 2x^2 = -4$
3) $x^3 + 1 = 0$
4) $x^3 + 4i - 3 = 0$
5) $x^2 - (-1-i)^4 = 0$
6) $x^4 - 2 - 2i\sqrt{3} = 0$
7) $x^6 + i^{32} = 0$

13) Show that x = cis210° is a solution of $x^2+\sqrt{3}x+1=0$