Math 302 - Ordinary Differential Equations (Vinroot)

Due: March 21, 2016 with HW5

1. Write each of the following complex numbers in the form $a+bi$.

(a): $-12e^{i\pi/4}$ **(b):** $e^{17i\pi}+2e^{5i\pi/4}$

2. Let α and β be real numbers. You will show here that $e^{i\alpha}e^{i\beta}=e^{i(\alpha+\beta)}$ using Euler's formula ($e^{i\theta}=\cos(\theta)+i\sin(\theta)$).

First write $e^{i\alpha}$ and $e^{i\beta}$ using Euler's formula, then multiply the expressions and expand the result to put it into standard form $a+bi$. That is, multiply out $(\cos(\alpha)+i\sin(\alpha))(\cos(\beta)+i\sin(\beta))$, and put all real terms together and all imaginary terms together. Then show you get the same result when applying Euler's formula to $e^{i(\alpha+\beta)}$ by using the trigonometric angle sum formulas (which are $\cos(\alpha+\beta)=\cos(\alpha)\cos(\beta)-\sin(\alpha)\sin(\beta)$ and $\sin(\alpha+\beta)=\sin(\alpha)\cos(\beta)+\cos(\alpha)\sin(\beta)$).

3. Find the general solution to each of the following homogeneous linear differential equations with constant coefficients. Use WolframAlpha or another mathematical tool to factor the characteristic polynomial.

(a): $y^{(5)}-6y^{(4)}+16y'''-32y''+48y'-32y=0$

(b): $y^{(5)}-11y^{(4)}+66y'''-230y''+481y'-507y=0$