ECE 3337: Signals & Systems Analysis
Class Worksheet 2

1. Express the signal $x(t) = 2 + \sin(3t) + \cos(2t)$ as the sum of an even-symmetric waveform $x_e(t)$ and an odd-symmetric waveform $x_o(t)$.

2. What is the period T_0 for the waveform $x(t) = 2 \sin\left(t + \frac{\pi}{2}\right)$?

3. Using Euler's formula, prove that $\cos(A - B) = \cos(A)\cos(B) + \sin(A)\sin(B)$. Hint: $e^{j(A-B)} = e^{jA}e^{-jB}$. Expand the left and right-hand sides and compare terms.

4. Find the angle (in radians) for the complex number $z = -3 - j4$.

5. If $z_1 = 3 + j4$ and $z_2 = 3 - j4$, calculate $\frac{z_1}{z_2}$ in polar form, with the angle expressed in degrees.

6. Plot the waveform $x(t) = 1 - u(1 - t) - u(t - 2)$.

7. Write the derivative $\frac{d}{dt}\left(4e^{jt} \times 6e^{j2t}\right)$.

8. Write the integral $\int t\, e^{-2t}\, dt$ (Review integration by parts)

9. What are the amplitude, phase, and frequency for the following signal?
$$x(t) = (1 + j)e^{-3jt}$$
Hint: First rewrite this formula in the standard format $x(t) = |A|e^{j(\omega_0 t + \theta)}$

10. Calculate (3+j)/(4+2j), and express your answer in the form: $a + jb$

Each question carries 10 points.