Pre-Lab Practice: Object in Equilibrium

Review the Textbook:

- *PHYS 1401: Serway & Vuille: Sec. 3.2, Appendix A.5., Ex 4.2,4.6*
- *PHYS 2425: Serway & Jewett: Sec. 3.4, Appendix B.4, Ex 5.1,5.4*

1. The hypotenuse of a right triangle is 7.0 m, and the side opposite to angle θ is 5.0 m. What is the value of cos(θ)? (0.70)

Vector $\vec{A}$ has a magnitude of 8.0 m and is at an angle of 45° CCW from the x-axis.

2. What is A_x, the x-component of vector A? (5.66 m)
3. What is A_y, the y-component of vector A? (5.66 m)

Vector $\vec{B}$ has components of $B_x = -3.0$ m/s and $B_y = -7.0$ m/s

4. What is the magnitude of vector $\vec{B}$? (7.62 m/s)
5. What is the direction of vector B?
   (-113.2° or 246.8°, where angles are measured CCW from the x-axis)

Given vectors r_1 = (1.40m; 30°), r_2 = (3.40m; 90°), and the equation of a new vector $R = -4.00\, r_1 + 1.50\, r_2$

6. What is R_x? (-4.85 m)
7. What is R_y? (2.3 m)
8. What is the magnitude of R? (5.37 m)
9. What is the direction of R? (154.6°)

10. Solve for C in the following: $r_1 + 2r_2 + C = 0$.
    ($C = (-1.21\text{m})\,\hat{x} - (7.5\text{m})\,\hat{y}$)

A horizontal ring is being pulled in three directions by force vectors F_1, F_2, and F_3. The forces balance, meaning the vectors add up to zero. Two of the forces are measured to be:

F_1 = (4N)x – (8N)y and F_2 = (-3N)x – (6N)y

11. Express vector $\vec{F}_3$ in component form.
    ($\vec{F}_3 = (-1\text{ N})\hat{x} + (14\text{ N})\hat{y}$)

12. Express vector $\vec{F}_3$ in magnitude-direction form.
    ($\vec{F}_3 = (14\text{ N})\angle 94.1°$)