Name: ___________________________  Section: __________

Instructions:
- Put name and section on exam and on equation sheet.
- Do not open the test until you are told to do so.
- Write your final answer in the box provided
- If you finish with less than 5 minutes remaining, please stay seated until the exam is over.
- Stop work immediately when time is over; pass exams to the aisle; stay seated until all exams are collected.
- Turn in your equation sheet with your examination

Guidelines:
- Assume 3 significant figures for all given numbers unless otherwise stated
- Show all of your work – no work, no credit
- Include units for all answers
- Include directions for all vectors

Hint:
- Glance over all problems, tackle the “easy” ones first
1. (4 pts) Vector $A$ has a magnitude of 4.2 mph. Using the given coordinate system, what is the $y$ component of vector $A$?

\[
\begin{align*}
\text{Component of } A \text{ in the } y \text{ direction.}
\end{align*}
\]

2. (12 pts) A board-foot is a unit of volume for wood. It is the volume of a 1 inch $\times$ 1 foot $\times$ 1 foot piece of wood. How many board-feet are in a piece of wood that measures 4 cm $\times$ 26 cm $\times$ 3.5 meters?

\[
\text{(1 inch = 2.54 cm)}
\]

\[
\begin{align*}
\text{Number of board-feet.}
\end{align*}
\]

3. (12 pts) Vector $A = (12i - 10j) ft$ and vector $B = (8i - 7j) ft$. Determine the direction of vector $C = A - B$. Give the direction as an angle counterclockwise from the x-axis.

\[
\begin{align*}
\text{Direction of } C \text{ as an angle.}
\end{align*}
\]
4. (12 pts) Paul Karakashian flies 55 miles at 20° north of east. He then flies 30 miles due south. How far and in what direction must Paul fly to return to where he started?

5. (12 pts) A Mini Cooper travels for 3 hours at 50 mph, and then covers 80 miles at 40 mph. Determine the average speed for the entire trip.
6. (12 pts) A truck starts from the origin and has a velocity-time graph as shown. Determine the position and acceleration at t = 4 seconds.

Position: 
Acceleration: 

7. (12 pts) Cuonzo Martin leans over the edge of a catwalk in Thompson-Boling arena and throws a basketball straight upward with a speed of 22 ft/sec. The catwalk is 95 feet above the arena floor. How long does it take before the ball hits the arena floor?
8. (12 pts) A train is slowing down at a constant acceleration. After going 200 meters in 12 seconds, the train has a velocity of 14 m/s. What was the initial velocity of the train?

9. (12 pts) A cockroach in Estabrook Hall has an initial velocity of \((-3.0\text{i} + 2.0\text{j})\) m/s and an acceleration of \((0.6\text{i})\) m/s\(^2\). What is the magnitude and direction of the velocity of the cockroach after 8 seconds?