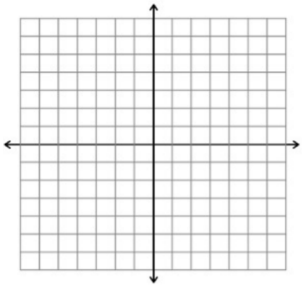
8.5, # 51: Consider vectors $\mathbf{v} = \langle -3, 6 \rangle$ and a vector $\mathbf{w} = \langle 1, 3 \rangle$.

(a). Depict $\text{proj}_{\mathbf{v}}\mathbf{w}$ on the graph paper below.



(b). Compute $\text{proj}_{\mathbf{v}}\mathbf{w}$.

(c). Find vectors $\mathbf{v}_1$ and $\mathbf{v}_2$ such that $\mathbf{v}_1$ is parallel to $\mathbf{v}$, $\mathbf{v}_2$ is orthogonal to $\mathbf{v}$, and $\mathbf{v}_1 + \mathbf{v}_2 = \mathbf{w}$.

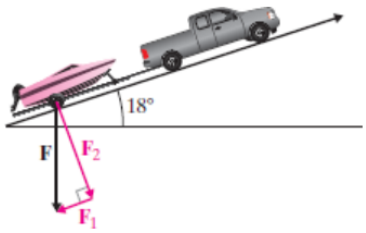
(d). Using the results from part (b) show that $\mathbf{v}_1$ is parallel to $\mathbf{v}$ by finding a constant c such that $\mathbf{v}_1 = c\mathbf{v}$.

(e). Show $\mathbf{v}_2$ is orthogonal to $\mathbf{v}$.

(f). Show $\mathbf{v}_1 + \mathbf{v}_2 = \mathbf{w}$.

8.5, # 65: Find the work W done by a force $\mathbf{F} = (40\mathbf{i} + 15\mathbf{j})$lb in moving an object in a straight line given by the displacement vector $D = (30\mathbf{i} + 10\mathbf{j})$ft.

8.5, # 55: A boat and trailer weighing a total of 450 lb are parked on a boat ramp with an 18° angle of inclination. Assume that the weight of the boat and trailer is evenly distributed between two wheels.



(a). Write the force vector $\mathbf{F}$ in terms of $\mathbf{i}$ and $\mathbf{j}$ representing the weight of the boat and trailer for a single tire.

(b). Find the component vector of $\mathbf{F}$ parallel to the ramp. Round values to 1 decimal place.

(c). Find the magnitude of the force needed to keep the trailer from moving down the ramp. Round to the nearest pound.

8.5, # 75: A tree removal service hooks a chain around the stump of a tree and attaches the other end of the chain to a pickup truck. The truck drags the stump horizontally 40 m to a wood chipper. The chain is directed upward 32° from the horizontal and the tension in the chain is 15,000 N. Find the amount of work done. Round to the nearest N·m.

9.1, # 23,29,32: Solve the following systems of equations if possible. If a system doesn't have a unique solution, write the general solution.
(a). $11x = -5 - 4y$
$2(x - 2y) = 22 + y$

(b). $3x - 4y = 6$
$9x = 12y + 4.$

(c). $2x - y = 8$
$x - \frac{1}{2}y = 4.$

9.1, # 52: A pharmacist wants to mix a 30% saline solution with a 10% saline solution to get 200 mL of a 12% saline solution. How much of each solution should she use?

9.1, # 65: Two runners begin at the same point on a 390-m circular track and run at different speeds. If they run in opposite directions, they pass each other in 30 sec. If they run in the same direction, they meet each other in 130 sec. Find the speed of each runner.

9.2, # 12,15,20,34: Solve the following systems of equations if possible. If a system doesn't have a unique solution, write the general solution.
(a). $3x = 5y - z + 13$
$-(x - y) - z = x - 3$
$5(x + y) = 3y - 3z - 4$

(b). $-4x - 3y = 0$
$3y + z = -1$
$4x - z = 12$

(c). $3x + 2y + 5z = 6$
$3y - z = 4$
$3x + 17y = 26.$

9.2, # 44: A theater charges \$50 per ticket for seats in Section A, \$30 per ticket for seats in Section B, and \$20 per ticket for seats in Section C. For one play, 4000 tickets were sold for a total of \$120,000 in revenue. If 1000 more tickets in Section B were sold than the other two sections combined, how many tickets in each section were sold?

9.2, # 46: A package in the shape of a rectangular solid is to be mailed. The combination of the girth (perimeter of a cross section defined by w and h) and the length of the package is 48 in. The width is 2 in. greater than the height, and the length is 12 in. greater than the width. Find the dimensions of the package.