   Find $2a + 3b$ and $\|a - b\|$.

2. Find a unit vector $\hat{v}$ in the same direction as $v = [-3, 7]$. 
3. Let \( \mathbf{a} = [1, 9] \) and \( \mathbf{b} = [-8, 1] \). Find \( \text{comp}_\mathbf{a} \mathbf{b} \) and \( \text{proj}_\mathbf{a} \mathbf{b} \), scalar and vector projections of \( \mathbf{b} \) onto \( \mathbf{a} \).

4. A woman exerts a horizontal force of 50 lb on a crate as she pushes it up a ramp 10 ft long and inclined at an angle of \( 20^\circ \) above the horizontal. Find the work done on the box to the nearest ft-lb.
5. Sketch the parametric curve \( x = 3 \cos t, \ y = 4 \sin t, \) for \( 0 \leq t \leq 2\pi, \) indicating the direction in which it is traced as \( t \) increases. Then eliminate the parameter \( t \) to obtain a Cartesian equation of the curve; identify it.

6. Find parametric equations of the line through points \( A (-1, 4) \) and \( B (4, 9). \)
7. Let \( f(x) = \begin{cases} 
    x^2 - 1 & \text{if } x \neq -1 \\
    -2 & \text{if } x = -1
\end{cases} \). Is \( f \) continuous at \( x = -1 \)? Justify your answer.

8. Find all horizontal and vertical asymptotes of the function \( f(x) = \frac{x^2 + 4x - 5}{x^2 - 4x + 3} \).
9. Find the limit \( \lim_{x \to -8} \frac{1}{8 + x} \), showing your steps by hand. Verify with calculator if desired.

10. Let \( g(x) = \frac{x^2 + x - 6}{|x - 2|} \). Compute its one- and two-sided limits as \( x \to 2 \). Sketch the graph of \( g \).
11. Find values of $a$ and $b$ that make $f$ continuous on $\mathbb{R}$.

$$f(x) = \begin{cases} 
\frac{x^2 - 4}{x-2} & \text{if } x < 2 \\
ax^2 - bx + 1 & \text{if } 2 \leq x < 3 \\
4x - a + b & \text{if } x \geq 3
\end{cases}$$

12. Use the Intermediate Value Theorem to determine an interval in which there is a root of the equation $x^4 + x - 7 = 0$. 
13. Find the limit \( \lim_{x \to -\infty} \frac{\sqrt{9x^6 - x}}{x^3 + 7} \), showing your steps by hand. Verify with calculator if desired.

14. Find the limit \( \lim_{x \to \infty} \left( \sqrt{4x^2 + x} - 2x \right) \), showing your steps by hand. Verify with calculator if desired.
15. Let \( \mathbf{r}(t) = [t^2 - t - 2, 4t^2] \) be a position vector function. It traces out a curve in the \( xy \)-plane.

(a) Find the secant vector between the positions (points) corresponding to \( t = 1 \) and \( t = 1.1 \).

(b) Find the tangent vector at \( t = 1 \).

16. Compute the derivative of \( g(x) = \sqrt{9 + 5x} \) using the limit definition of derivative. Show your steps by hand. Verify with calculator if desired.