Math 150 - Week-In-Review 13
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Problem Statements

1. Find the component form and magnitude of the vector \( \mathbf{v} \).
   
   **Initial Point:** \((2, 4)\)  \hspace{1cm}  **Terminal Point:** \((-34, -11)\)

2. Given the following vectors, find \( \mathbf{u} + 2 \mathbf{v} \) and \( \mathbf{u} - \mathbf{v} \).

   
   \[ \begin{align*}
   \mathbf{v} & = \langle 3, 7 \rangle \\
   \mathbf{u} & = \langle 2, 4 \rangle
   \end{align*} \]

3. Find a unit vector \( \mathbf{u} \) in the direction of \( \mathbf{v} \), given that \( \mathbf{v} = \langle 3, 7 \rangle \).

4. Find the component form of \( \mathbf{v} = -\mathbf{u} + \mathbf{w} \), where \( \mathbf{u} = 2 \mathbf{i} - \mathbf{j} \), and \( \mathbf{w} = \mathbf{i} + 5 \mathbf{j} \).

5. Find the component form of \( \mathbf{v} \) given its magnitude and the angle it makes with the positive x-axis.
   \[ \| \mathbf{v} \| = 3, \ \theta = 225^\circ \]

6. Find \( \mathbf{u} \cdot \mathbf{v} \) and \( (\mathbf{u} \cdot \mathbf{v})\mathbf{v} \) for \( \mathbf{u} = \langle 2, 4 \rangle \) and \( \mathbf{v} = \langle -6, 2 \rangle \).

7. Find the angle between \( \mathbf{u} \) and \( \mathbf{v} \) for \( \mathbf{u} = \langle 2, 4 \rangle \) and \( \mathbf{v} = \langle -6, 2 \rangle \).

8. Find the projection of \( \mathbf{u} = \langle 2, 4 \rangle \) onto \( \mathbf{v} = \langle -6, 2 \rangle \). Then write \( \mathbf{u} \) as the sum of two orthogonal vectors, one of which is \( \text{proj}_\mathbf{v} \mathbf{u} \).

9. Compute the difference quotient for \( f(x) = \frac{x}{2x + 1} \).

10. Compute the difference quotient for \( g(x) = \sqrt{12 - 4x} \).

11. Solve using substitution: \[
    \begin{align*}
    x + 5y & = 47 \\
    7x - 8y & = -15
    \end{align*}
\]

12. Solve using elimination: \[
    \begin{align*}
    4x - 5y & = 8 \\
    -8x + 10y & = -16
    \end{align*}
\]

13. Solve using whichever method you choose: \[
    \begin{align*}
    3x - 9y & = 11 \\
    -4x + 12y & = 0
    \end{align*}
\]