Precalculus for Juniors **Name _____**

Assignment 3 – Linear Combinations of 2D Vectors **Per _____ Date_____**

I. Given the linear forms of vectors **u**, **v**, *and* **w**, *find the linear combination form of the specified vectors.*

$\mathbf{u} = 2\mathbf{i} + 3\mathbf{j}$, $\mathbf{v} = \mathbf{i} - 4\mathbf{j}$, $\mathbf{w} = -3\mathbf{i} + 5\mathbf{j}$

1. $\mathbf{u} + \mathbf{v}$

2. $2\mathbf{u} - \mathbf{w}$

3. $\mathbf{v} + 3\mathbf{w}$

4. $\mathbf{v} - 4\mathbf{u}$

5. $\mathbf{v} - \mathbf{u} + \mathbf{w}$

6. $2\mathbf{u} - 3\mathbf{v} + 4\mathbf{w}$

II. Find the unit vector that is in the same direction as the given vector.

7. $\mathbf{u} = 8\mathbf{i} + 6\mathbf{j}$

8. $\mathbf{u} = 12\mathbf{i} - 5\mathbf{j}$

9. $\mathbf{u} = 2\mathbf{i} + 3\mathbf{j}$

III. Find the vector **v** with the given magnitude that is in the same direction as **u**.

10. $\|v\| = 7$, $\mathbf{u} = 3\mathbf{i} + 4\mathbf{j}$

11. $\|v\| = 10$, $\mathbf{u} = 2\mathbf{i} - 3\mathbf{j}$

12. $\|v\| = 4$, $\mathbf{u} = 5\mathbf{j}$

IV. Write the vector with the given initial and terminal points in terms of the standard unit vectors **i** and **j**.

13. I(-3, 1), T(4, 5)

14. I(0, 2), T(3, 6)

15. I(-6, 4), T(0, 1)

V. Find the magnitude and direction angle of each vector.

16. $\mathbf{v} = 5(\cos 135^\circ i + \sin 135^\circ j)$

17. $\mathbf{v} = 6\mathbf{i} + 2\mathbf{j}$

18. $\mathbf{v} = -4\mathbf{i} - 7\mathbf{j}$

VI. Write the component form of each vector described.

19. $\|v\| = 7,\ \theta = 30^\circ$

20. $\|v\| = 12,\ \theta = 150^\circ$

21. $\|v\| = 10,\ \theta = 315^\circ$

22. $\|v\| = 14,\ \theta = \frac{3\pi}{4}$

23. $\|v\| = 15$, direction of <3, 6>

24. $\|v\| = 15$, direction of <-2, -7>

25. $5(\cos 120^\circ i + \sin 120^\circ j) + 4(\cos 30^\circ i + \sin 30^\circ j)$