Math Analysis Honors Worksheet – Vector Applications

I. Resolve the following forces into component form:

1. 200 lbs. at 20° above horizontal
2. 54 N at 75° above horizontal
3. 312 mph on a bearing of 102°
4. 175 m/min on a heading of 300°

II. Find

a) The resultant of F_1 and F_2 in component form.
b) The magnitude and direction (as a bearing) of the resultant from (a)

5. F_1 = (14,-5) F_2 = (23,16)

6. F_1 = (-20,12) F_2 = (45,-15)

7. F_1 = (-6,-30) F_2 = (10,-4)

8. F_1 = (50,100) F_2 = (0,-92)

III. Use the dot product formula $u \bullet v = \|u\|\|v\|\cos q$ to find the measure of the angle È between **u** and **v**.

9. **u** = (4,-1,12) **v** = (-5,8,-6)

10. **u** = (5,-12,3) **v** = (-3,0,5)

12. **u** = (450,-35) **v** = (-300,75)

13. **u** = (18,3) **v** = (5,-7)

14. Find the angle between F_1 and F_2 in problem 7.

IV. Use the vector cross product to find the area of the triangle ABC whose vertices are given. (Area of parallelogram = $\|u \times v\|$) Hint: Resolve vector AB and vector AC into component form and find $\frac{1}{2}$ the area of the parallogram

15. A(-8,13,0) B(2,-11,5) C(4,9,1)
16. A(10,5,2) B(-3,8,3) C(0,-6,5)
17. A(4,-1,6) B (5,2,-4) C(1,0,6)

V. Find the volume of the parallelpiped whose edges are the vectors **u**, **v**, and **w**

18. **u** =(1,0,6) **v** = (-1,4,1) **w** = (-3,2,4)

19. **u** =(3,2,3) **v** = (-1,4,1) **w** = (-2,-2,-2)

20. **u** =(4,1,3) **v** = (-1,-1,5) **w** = (-2,3,5)

VI. Write the vector **t** as a linear combination of $\vec{u} = (2,5)$ and $\vec{v} = (-3,2)$

21. **t** = (18,7)

22. **t** = (10, -2)

23. **t** = $\left(\frac{-3}{2},1\right)$