Vectors and Vector Products
Goal: Master the use of these basic vector operations; you will need them easily at your beck & call!
Show all of your work in full detail with <u>*complete*</u> *mathematical statements*!

Add/subtract the following vectors:

1. $\left(3\hat{i}+2\hat{j}\right)+\left(\hat{i}+5\hat{j}\right)$

2. $\left(-\hat{i}+\hat{j}\right)+\left(6\hat{i}+4\hat{j}\right)$

3. $\left(6\hat{i}+2\hat{j}\right)+\left(-7\hat{i}+3\hat{j}\right)$

4. $\left(x\hat{i}+4x\hat{j}\right)+\left(3\hat{i}+2y\hat{j}\right)$

5. $\left(3x^2\hat{i}+xy^2\hat{j}\right)+\left(y^3\hat{i}+4y\hat{j}\right)$

6. $\left(2xe^{2x}\hat{i}+2\sin\theta\,\hat{j}\right)+\left(3\cos\theta\,\hat{i}+2y^4\hat{j}\right)$

Find the following scalar products:

7. $\left(3\hat{i}+2\hat{j}\right)\cdot\left(\hat{i}+5\hat{j}\right)$

8. $\left(3x\hat{i}+2x\hat{j}\right)\cdot\left(7x\hat{i}+5y\hat{j}\right)$

9. $\left(2\hat{i}-3\hat{j}+\hat{k}\right)\cdot\left(3\hat{i}+2\hat{j}+4\hat{k}\right)$

10. $\left(2x\hat{i}+y\hat{j}+xz^2\hat{k}\right)\cdot\left(3\hat{i}+2z\hat{j}+3y^2\hat{k}\right)$

11. $\left(3\hat{j}+2\hat{k}\right)\cdot\left(\hat{i}-5e^{2x}\hat{j}\right)$

12. $\left(2x^2\hat{i}-x\hat{j}+\hat{k}\right)\cdot\left(3\hat{i}+2x\hat{j}-4x^2\hat{k}\right)$

Compute the following vector products (<u>use a separate page</u> AND use determinants!):

13. $\left(3\hat{i}+2\hat{j}\right)\times\left(\hat{i}+5\hat{j}\right)$

14. $\left(\hat{i}+\hat{k}\right)\times\hat{j}$

15. $\left(2\hat{i}-3\hat{k}\right)\times\left(-4\hat{i}+6\hat{k}\right)$

16. $\left(\hat{i}+3\hat{j}+\hat{k}\right)\times\left(-\hat{i}-2\hat{j}+\hat{k}\right)$

17. $\left(x^2\hat{i}+y\hat{j}+z^3\hat{k}\right)\times\left(xyz\hat{j}\right)$

18. $\left(2x\hat{i}-3x\hat{j}\right)\times\left(y\hat{j}+e^{xy}\hat{k}\right)$