

Math 126 Worksheet

Vector Operations and Line/Plane Logic

You will enter your answers on Canvas during or after quiz section. You can find this under “Quizzes” in Canvas, you have until the day after quiz section to enter your answers. Work in groups and with your TA to make sure you have the correct answers for the following. This sheet is just for your convenient so you can see what the questions are before you open the quiz.

1. For each expression below determine where it is a vector (**V**), a scalar (**S**), or nonsense (**N**). Note that **a**, **b**, **u**, and **v** are vectors, while c and d are scalars.

(1) $\mathbf{a} \cdot (\mathbf{u} - c\mathbf{v})$ **V** **S** **N**

(2) $\mathbf{a} \cdot (\mathbf{b} + c)$ **V** **S** **N**

(3) $(c + d) \cdot \mathbf{a}$ **V** **S** **N**

(4) \mathbf{uv} **V** **S** **N**

(5) $\frac{\mathbf{a}}{c}$ **V** **S** **N**

(6) $\frac{c}{\mathbf{a}}$ **V** **S** **N**

(7) $(\mathbf{a} \cdot \mathbf{b}) \times \mathbf{u}$ **V** **S** **N**

(8) $\mathbf{a} \times (\mathbf{b} \times \mathbf{u})$ **V** **S** **N**

(9) $\mathbf{a} \cdot (\mathbf{b} \times \mathbf{u})$ **V** **S** **N**

2. For each statement below, determine if the statement is always true or see if you can come up with an example where it is false. Each question is about lines and planes in 3-dimensions. For each problem try to draw several pictures of the scenario and look around the room you are in for examples (in my lecture videos I show how I always draw lines and planes in 3D). Your ability to use correct logic on these problems will help you a lot in the 12.5 section.

- (10) T/F: Two lines perpendicular to the same plane are parallel.
(11) T/F: Two lines parallel to the same plane are parallel.
(12) T/F: Two planes perpendicular to the same plane are parallel.
(13) T/F: Two planes parallel to the same plane are parallel.
(14) T/F: Two lines perpendicular to the same line are parallel.
(15) T/F: Two lines parallel to the same line are parallel.
(16) T/F: Two planes either intersect or are parallel.
(17) T/F: Two planes perpendicular to the same line are parallel.
(18) T/F: Two planes parallel to the same line are parallel.

If time remains, please ask your TA (and classmates) questions on the homework from 12.3, 12.4 and 12.5.