**Multivariable Portfolio Notes**
**Tips and Suggestions**

When referring to the chapters of sections in the textbook, capitalize them since they are proper names. "Chapter 9" reads better than "Chapter Nine". It might be best to address the chapter/section by its full title the first time: "Chapter 9 – Vectors and the Geometry of Space".

Variables and unknown constants are italicized, but numbers are not. Vector names need to either be in bold (not italicized) or written with the arrow notation.

- $72xy$ is preferred over 2xy or $72xy$
- write $\mathbf{r}(t)$ or $\vec{r}(t)$ instead of r(t)

Utilize spacing in mathematical expressions to make them easier to read.

- (1, 0.2, 5) is easier to read than (1,0.2,5)
- $f(x, y) = 2x + 4(y + 3)$ is better than $f(x,y)=2x+4(y+3)$

Be sure to end your solutions with a conclusion statement, such as "Therefore, the angle measure between the two vectors is 42° ".

Watch for confusing page and line breaks.

- A mathematical expression inline with the text should be completely contained in a single line.
- When showing calculations, keep them with the associated text on a single page.

Include titles with your graphs. Be sure your text explains any following figures or calculations – don't just throw in a graph without describing what it is.

Double-spacing generally reads better than single-spacing, and fonts like New Times Roman read easier than ones like Arial. If you choose single-spacing, add extra lines between text blocks and graphs/calculations.

Maple does have a tendency to create a lot of extra space around graph illustrations. You can use the cropping and resizing tools to better fit the image into Word.

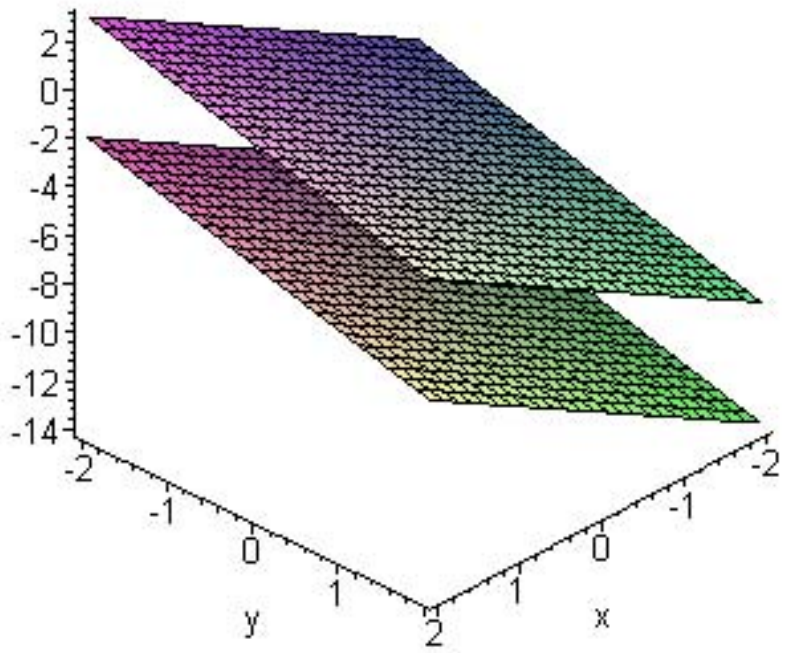
Try reading your text out loud. You will be surprised how something read to yourself sounds awkward when read aloud.

Keep text in non-indented blocks and graphs/calculations centered (some prefer indented calculations).

The following pages illustrate a sample “Draft” and “Final” version of the same work. Note how the suggestions above make for a better read in the “Final” version.

Draft:

Problem from section 9.5: Show that the planes $4x-2y-2z=6$ and $z=2x-y-8$ are parallel.
To show that two planes are parallel, you must show that their normal vectors, n1 and n2, are parallel. This can be done by showing $n1 \times n2=0$ or that $n1=c*n2$.
$n1=\langle 4,-2,-2\rangle$
$n2=\langle 2,-1,-1\rangle$
$n1=2n2$ and $n1 \times n2=\langle 2-2,-4+4,-4+4\rangle=\langle 0,0,0\rangle=0$



Final:

**Problem from "Section 9.5 – Equations of Lines and Planes":**

Show that the planes $4x - 2y - 2z = 6$ and $z = 2x - y - 8$ are parallel.

To show that two planes are parallel, you must show that their normal vectors, $\vec{n}_1$ and $\vec{n}_2$, are parallel. This can be done by showing $\vec{n}_1 \times \vec{n}_2 = \vec{0}$ or that $\vec{n}_1 = c \cdot \vec{n}_2$, so let's first find the two normal vectors of the given planes:

$$\vec{n}_1 = \langle 4, -2, -2 \rangle \text{ and } \vec{n}_2 = \langle 2, -1, -1 \rangle$$

Clearly, $\vec{n}_1 = 2 \cdot \vec{n}_2$. Since the normal vectors are scalar multiples of each other, the vectors are parallel. This can be verified with the cross product of the two normal vectors:

$$\begin{aligned} \vec{n}_1 \times \vec{n}_2 &= \langle 2-2, -4+4, -4+4 \rangle \\ &= \langle 0, 0, 0 \rangle \\ &= \vec{0} \end{aligned}$$

Since the normal vectors, $\vec{n}_1$ and $\vec{n}_2$, are parallel, their associated planes must too be parallel. This can be verified by graphing the two planes in one window, as shown below in Figure 1.

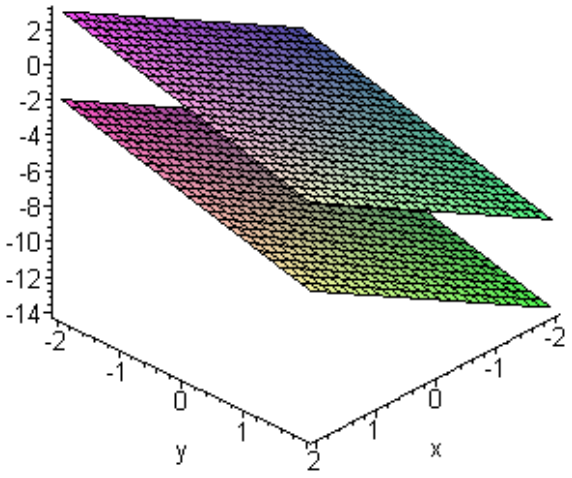



Figure 1