

**Math 163**  
**Fall 2023**  
**Assessment 3**  
**Dusty Wilson**

Name: \_\_\_\_\_

*He is like the fox, who effaces his tracks in  
the sand with his tail.*

Niels Henrik Abel  
1802 - 1829 (Norwegian mathematician)

**No work = no credit**

1. Warm-ups

(a) (1 point)  $\vec{k} \times \vec{j} =$  (a) \_\_\_\_\_ (b) (1 point)  $\frac{2}{0} =$  (b) \_\_\_\_\_

(c) (1 point)  $\vec{i} \cdot \vec{j} =$  (c) \_\_\_\_\_

2. (1 point) In the quote above, Abel talks about Gauss' writing style. According to Abel, how easy was it to understand Gauss' work? Answer using complete English sentences.

3. Answer the following.

(a) (2 points) Find the equation of a line that goes through the point  $(5, 4, 2)$  and is parallel to the vector  $\vec{a} = \langle 6, 8, 2 \rangle$ .

(b) (2 points) Find the equation of the plane that includes the point  $(5, 5, 3)$  and has normal vector  $\vec{a} = \langle 8, 9, 5 \rangle$ .

4. (4 points) Find the equation of the line in  $\mathbb{R}^3$  that goes through the points  $A(3, 8, 4)$  and  $B(6, 6, 1)$ . Express your answer in parametric AND symmetric form.

5. (4 points) Find the equation of the plane in  $\mathbb{R}^3$  that goes through the points  $A(1, 1, 7)$ ,  $B(7, 8, 4)$ , and  $C(2, 5, 9)$ . You do not need to simplify your result.

6. (4 points) Find the equation of the line where the planes  $3x + y = 6$  and  $y + 5z = 15$  intersect.
7. Answer the following.
- (a) (2 points) Give an example of the equations of two parallel planes.
- (b) (2 points) Give an example of two lines in  $\mathbb{R}^3$  that do NOT intersect. Show that the lines do NOT intersect.
8. (4 points) Use a calculator to graph the parametric curve  $x = 2 + 3 \cos(\theta)$  and  $y = 4 + 5 \sin(\theta)$  on  $\frac{\pi}{2} \leq \theta \leq 2\pi$ . Clearly indicate the direction the curve is traversed as well as important points.

