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| Test 1Dusty Wilson Math 153 No work = no credit  No Symbolic Calculators | **Name:** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  *I myself, a professional mathematician, on re-reading my own work find it strains my mental powers to recall to mind from the figures the meanings of the demonstrations, meanings which I myself originally put into the figures and the text from my mind. But when I attempt to remedy the obscurity of the material by putting in extra words, I see myself falling into the opposite fault of becoming chatty in something mathematical.*  Johannes Kepler (1597 - 1630)  German astronomer |

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| Warm-ups (1 pt each): | =\_\_\_\_\_ | =\_\_\_\_\_ | =\_\_\_\_\_ |

(1 pt) Based upon the quote above, how did easily did Kepler understand his earlier work? Answer using complete English sentences.

(15 pts) Consider the plane 

1. Find three points on the plane (not co-linear)

1. Find the distance from the plane to the point .
2. Find the equation of the line that is normal to the plane through point *A*. Give your answer parametrically.

(10 pts) Consider the two planes  and .

1. Find the angle between the two planes.

1. Find the equation of the line where the two planes intersect. Give your answer parametrically.

(10 pts) Use the arclength formula to verify that the circumference of a circle with radius *R* is . Begin by writing a parametric equation for a circle of radius *R* centered at the origin.

(10 pts) Write  in the form  without finding  for the position vector-valued function  at . That is, you need to find .

(15 pts) Find  for 