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| Assessment 4Dusty Wilson Math 163No work = no credit**No CAS Calculators** | **Name**: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*The enormous usefulness of mathematics in the natural sciences is something bordering on the mysterious.*Eugene Wigner1902 - 1995 (Hungarian Physicist) |
| Warm-ups (1 pt each): | =\_\_\_\_\_ | =\_\_\_\_\_ | =\_\_\_\_\_ |

(1 pt) The quote by Wigner (above) is from the reading for this week. According to Wigner, how ought we to explain the usefulness of mathematics? Answer using complete English sentences.

(12 pts) Answer the following

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| a.) A parametric representation for a circle with radius 2 that is centered at the origin is: |  = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |
| b.) A parametric representation for the function  is: |  = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |
| c.) I bought a “new” car this week (true story). As I was testing it out, I tried to see how quickly it could get up to speed and then also tested the brakes coming down a steep hill. In the vocabulary of this class, what was I exploring? |  |
| d.) If you are given an acceleration vector-valued function , how would you go about finding the position function? What (if any) additional information would you need? | e.) Consider the graph below. What is the name of the unit vector : \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Sketch the osculating (kissing) circle at point *A*. |
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(16 pts) Consider the space curve 

1. Find the curvature of 

1. At the point , the normal vector to  is . Find the equation of the osculating plane to  at point *A*.