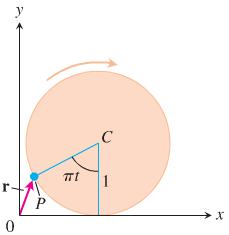
**Math 2315 – Calculus III** ***Exam* 2 *Review***

*Professor*: Fred Khoury

1. Find the lengths of the curves
2. 
3. 
4. Find ***T***, ***N***, ***B***, τ, and κ at the given value of *t* for the plane curves
5. 
6. 
7. 
8. Write ***a*** of the motion  at *t* = 0 without finding ***T*** and ***N***.
9. 
10. 
11. Graph the curves and sketch their velocity and acceleration vectors at the given values of *t*. Then write ***a*** of the motion  without finding ***T*** and ***N***, and find the value of κ at the given values of *t*.
12. 
13. 
14. The position of a particle in the plane at time *t* is . Find the particle’s highest speed.
15. A particle traveling in a straight line located at the point  and has speed 2 at time t = 0. The particle moves toward the point  with constant acceleration . Find the position vector  at time *t*.
16. At point *P*, the velocity and acceleration of a particle moving in the plane are  and . Find the curvature of the particle’s path at *P*.
17. A circular wheel with radius 1 ft and center *C* rolls to the right along the *x*-axis at a half-run per second. At time *t* seconds, the position vector of the point *P* on the wheel’s circumference is





1. Sketch the curve traced by *P* during the interval 
2. Find ***v*** and ***a*** at *t* = 0, 1, 2, and 3 and add these vectors to your sketch
3. At any given time, what is the forward speed of the topmost point of the wheel? Of *C*?
4. A shot leaves the thrower’s hand 6.5 *ft* above the ground at a 45° angle at 44 *ft/sec*. Where is it 3 *sec* later?
5. Find equations for the osculating, normal and rectifying planes of the curve  at the point (1, 1, 1).
6. Find the following for all values of *t* for which the given curve is defined by 
7. Find the tangent vector and the unit tangent vector
8. Find the curvature.
9. Find the principal unit normal vector.
10. Verify that 
11. Graph the curve and sketch ***T*** and ***N*** at two points.
12. Consider the position vector  of the moving objects
13. Find the normal and tangential components of the acceleration.
14. Graph the trajectory and sketch the normal and tangential components of the acceleration at two points on the trajectory. Show that their sum gives the total acceleration.

***Solution***

1.  
2. 





1.  

|  |  |
| --- | --- |
|  |  |

1. 
2. 
3. 

|  |  |  |
| --- | --- | --- |
|  |  |  |

1. 66.27*ft* or 66 *ft*., 3 *in*
2.   
3. 







*e*)



1. 



