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Math124A15, section F, Fall 2015
Instructor: Jonah Ostroff

WebAssign
Assignment #1: Precalculus Review (Homework)

Current Score : – / 40 **Due :** Thursday, October 8 2015 11:58 PM PDT

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1. –/8 points

Consider the circle of radius 10 centered at the origin. Provide answers accurate to two decimal places.

(a) The equation of the tangent line to the circle through the point (-6,8) has equation $y=$ [ ] $x +$ [ ] .

(b) Suppose that L is a tangent line to this circle which is parallel to the line $y=5x+7$ and has a negative y intercept. Then the point of tangency of L with this circle is ([ ] , [ ]).

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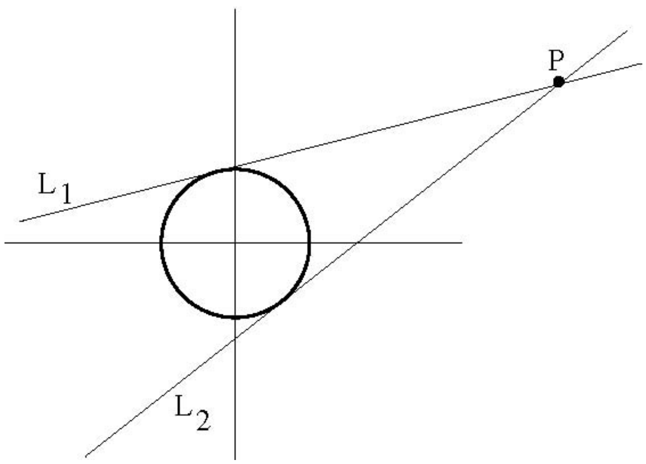
2. –/8 points

Draw the unit circle and plot the point $P=(7,2)$. Observe there are TWO lines tangent to the circle passing through the point P. Answer the questions below with 3 decimal places of accuracy.



(a) The line L_1 is tangent to the unit circle at the point ([ ] , [ ]).

(b) The tangent line L_1 has equation:
$y=$ [ ] x + [ ] .

(c) The line L_2 is tangent to the unit circle at the point ([ ] , [ ]).

(d) The tangent line L_2 has equation:
$y=$ [ ] x + [ ] .

3. –/3 points

The parametric equations

$$x = x_1 + (x_2 - x_1)t, \quad y = y_1 + (y_2 - y_1)t$$

where $0 \le t \le 1$ describe the line segment that joins the points $P_1(x_1, y_1)$ and $P_2(x_2, y_2)$.

Draw the triangle with vertices $A(1, 1)$, $B(5, 4)$, $C(1, 6)$. Find the parametrization, including endpoints, and sketch to check. (Enter your answers as a comma-separated list of equations. Let x and y be in terms of t.)

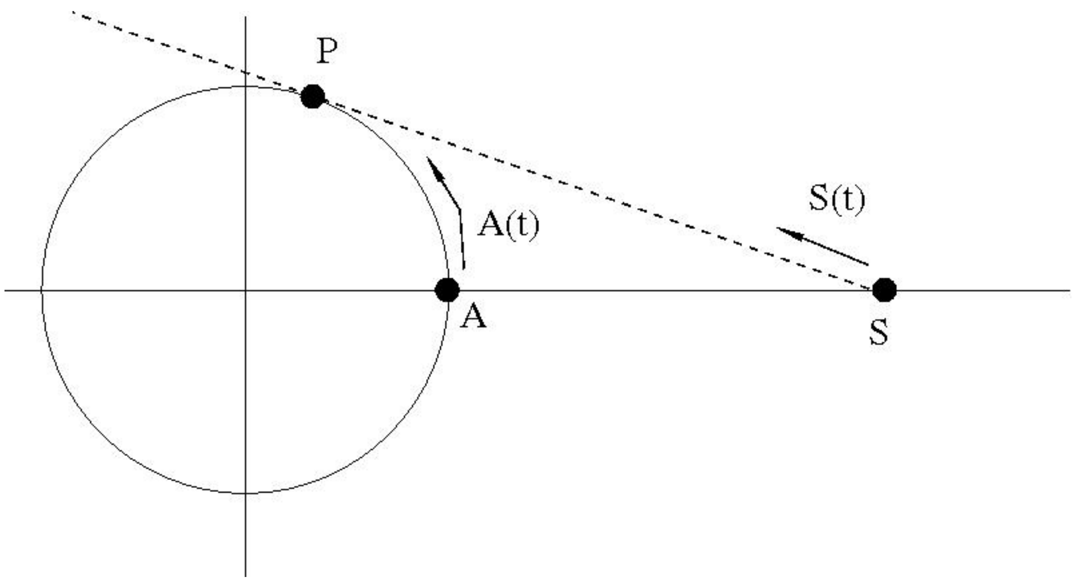
A to *B*

B to *C*

A to *C*

4. –/16 points

An ant is moving around the unit circle in the plane so that its location is given by the parametric equations *(cos(π t), sin(π t))*. Assume the distance units in the plane are "feet" and the time units are "seconds". In particular, the ant is initially at the point A=(1,0). A spider is located at the point S=(5,0) on the *x*-axis. The spider plans to move along the tangential line pictured at a constant rate. Assume the spider starts moving at the same time as the ant. Finally, assume that the spider catches the ant at the tangency point P the second time the ant reaches P.



(a) The coordinates of the tangency point *P*=(

,

).

(b) The FIRST time the ant reaches *P* is

seconds.

(c) The SECOND time the ant reaches *P* is seconds.

(d) The parametric equations for the motion of the spider are:

x(t)=

t +

;

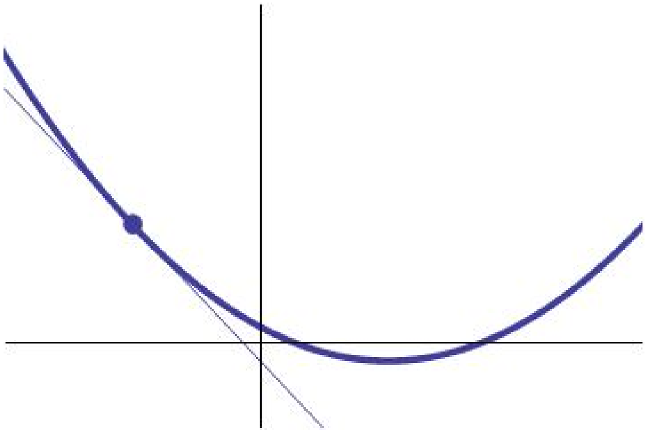
y(t)=

t +

.

5. –/5 points

The graph of the quadratic function $y = 2x^2 - 4x + 1$ is pictured below, along with the point P=(-1,7) on the parabola and the tangent line through P. A line that is tangent to a parabola does not intersect the parabola at any other point. We can use this fact to find the equation of the tangent line.



(a) If m is the slope of the tangent line, then using the slope/point formula, the equation of the tangent line will be:

y = m(x-

) +

(b) The values of x for which the point (x,y) lies on both the line and the parabola satisfy the quadratic equation:

$2x^2 + bx + c = 0$

where b=

and c=

(b and c should depend on m).

(c) For most values of m, the quadratic equation in part (b) has two solutions or no solutions. The value of m for which the quadratic equation has exactly one solution is the slope of the tangent line. This value is m =

.