Math 124: Calculus I - Dr. Andy Loveless

1st Homework (8-10 hrs of work)
Closing Mon, Jan 9: 10.1
Closing Wed, Jan 11: 2.1
Closing Fri, Jan 13: 2.2

Entry Task (Some precalculus)

1. Without a calculator, give the values of $\cos\left(\frac{\pi}{4}\right), \sin\left(\frac{\pi}{3}\right), \sec\left(\frac{2\pi}{3}\right), \tan\left(-\frac{\pi}{4}\right)$

2. Consider the circle with radius 4 centered at (2,0).

(a) Find the point on the circle where $x = 1$ and y is positive.

(b) Find the equation of line through the point you just found and the center.

(c) Find the equation of the tangent line to the circle at the point you found.

Homework Help (Just like problem 2 of the first homework):
Find the equations for all lines that are tangent to the unit circle and also pass through the point (-3, 4).

10.1 Parametric Equation Basics for Applications

Parametric Equations are any set of equation of the form x = x(t), y = y(t).

Linear Motion: $x = x_0 + v_x t$

$$y = y_0 + v_y t$$

Example:

The location of a bug on the xy-plane after *t* seconds is given by

$$x = 1 + 2t \quad , \quad y = 3t$$

You do:

Plug in t = -1, t = 0, t = 1, and t = 2.

Plot these points in the xy-plane

Circular Motion:

$$x = x_c + r\cos(\theta_0 + \omega t)$$
$$y = y_c + r\sin(\theta_0 + \omega t)$$

Example:

The location of an ant on the xy-plane

after *t* seconds is given by

$$x = 2\cos\left(\frac{\pi}{6} + \frac{\pi}{2}t\right)$$
$$y = 3 + 2\sin\left(\frac{\pi}{6} + \frac{\pi}{2}t\right)$$

You do: Without a calculator,

plug in t = 0, t = 1, t = 2, t = 3, and t = 4.

Plot these points in the xy-plane

What we will do in this course:
We learn the basic tools of differential calculus which provide the essential language for engineering, science and economics. Specifically,

1. 10.1 – Para. Equations/Review
2. Ch. 2 – Limits and tangents
   ($\lim_{h\to 0}$??, $\lim_{x\to\infty}$??, $\frac{f(x+h)-f(x)}{h}$)
3. 3.1-3.6, 10.2 – All Derivative Rules (product, quotient, chain rules, logarithmic diff., implicit diff., f'(x) = ??, $\frac{dy}{dx}$)
4. 3.9, 3.10, Ch. 4 – Applications (rates, max/min, curve sketching)

How to get help: First, work ahead on homework; pretend the closing date is actually two days early.

1. Ask questions in quiz section.
2. Math Study Center – Comm. B-014
   Mon – Thurs: 9:30am-9:30pm
   Fri : 9:30am-1:30pm
   Sun: 2:00pm-6:00pm
3. CLUE – Mary Gates Commons
   Sun – Thurs: 7pm-midnight
4. Work in study groups.
5. Visit your TA's office hours.
6. Visit my office hours.
7. If you have tried all these other things, then email me.