MATH 152

Today

1. Questions/WeBWorK
2. 9.2 Calculus on Parametric Equations
3. Area Axioms

Goals:

1. 9.2 Calculus on Parametric Equations (Understand how to find slopes of and tangents to parametric curves)
2. Introduce Area Axioms (Understand the basic assumptions we make about area and how they lead to what we know)

Where is today's material used?

1. Parametric equations can be used to describe curves for which y is not a function of x. The parameter is often time, t, in which case the parametric curve describes the behavior of something over time.

9.2: Calculus on Parametric Equations

1. **Theorem:** If $x = f(t)$ and $y = g(t)$ are differentiable functions of t, then $\dfrac{dy}{dx} = \dfrac{g'(t)}{f'(t)}$ whenever $f'(t) \neq 0$.
2. Vertical and horizontal asymptotes
3. Area Axioms: Let R and S be regions in the plane.
   (a) (Existence) R has an **area**, denoted $A(R)$.
   (b) (Congruence) If S is congruent to R, then $A(S) = A(R)$.
   (c) (Dominance) If S is contained in R, then $A(S) \leq A(R)$.
   (d) (Unit) If R is a unit square, then $A(R) = 1$.

(e) (Additivity) If R and S share no interior points, then $A(R \cup S) = A(R) + A(S)$.

4. Examples: 9.2, p. 513: 6, 16

Next Time

1. 5.1 Area with curvy sides
2. Turn in WeBWorK 9.2, Set02-ParametricEqDiff: 3, 5