MATH 152

Today

1. WeBWorK/Questions
2. 9.3 Polar coordinates

Goals:

1. 9.3 Polar Coordinates (Understand how to interpret polar coordinates and convert between polar and Cartesian coordinates' understand derivative computations in polar coordinates)

Where is today's material used?

1. Polar coordinates are useful for describing phenomena with some kind of circular symmetry.

9.3 Polar Coordinates

1. **Definition:** Let P be a point in the xy-plane and let O denote the origin. The **polar coordinates** of P are (r, θ), where $|r|$ is the distance from O to P and θ is the angle from the positive x-axis to the ray $\overrightarrow{OP}$ measured counterclockwise. We allow $r < 0$, interpreting it as opposite the direction θ would indicate.
2. $x = r\cos\theta, y = r\sin\theta$
3. $x^2 + y^2 = r^2$, $\tan\theta = \dfrac{y}{x}$ **(CAUTION!** $\arctan(y/x) \in (-\pi/2, \pi/2)$**)**
4. Typical form for a polar curve: $r = f(\theta)$.
5. Can view polar curves parametrically: $x = r\cos\theta = f(\theta)\cos\theta, y = r\sin\theta = f(\theta)\sin(\theta)$.
6. Examples: 9.3, p. 522: 13-16, 23-40, 46, 47, 53

Next Time

1. 9.4: Polar area
2. Turn in WeBWorK 9.3 Set18-Polar: 1, 2