Review: True or False?

Monday, February 22

Parametric Curves, Polar Coordinates

- The curve defined by any set of parametric equations $(x, y) = (f(t), g(t))$ can also be defined by an equation of the form $y = h(x)$.

- The curve defined by any equation of the form $y = h(x)$ can also be defined by a set of parametric equations $(x, y) = (f(t), g(t))$.

- If $dx/dt = 0$ at some point on a curve then the tangent line at that point is horizontal.

- If $dy/dt = 0$ and $dx/dt = 0$ at some point on a curve then the tangent line at that point could be horizontal, vertical, or neither.

- If $f(\theta) = -f(-\theta)$ for all θ then the curve defined by $r = f(\theta)$ will have a vertical axis of symmetry.

Polar Curves, Vectors

- If $x = f(t)$ and $y = g(t)$ are twice differentiable then $\frac{d^2y}{dx^2} = \frac{d^2y/dt^2}{d^2x/dt^2}$.

- The distance traveled by an object is equal to the integral of its velocity over time.

- For any vectors u and v in $\mathbb{R}^n$, $|u + v| \leq |u| + |v|$.

- For any $\mathbf{u}, \mathbf{v}, \mathbf{w} \in \mathbb{R}^3$, $\mathbf{u} \times (\mathbf{v} \times \mathbf{w}) = (\mathbf{u} \times \mathbf{v}) \times \mathbf{w}$.

- For any $\mathbf{u}, \mathbf{v} \in \mathbb{R}^3$, $\mathbf{u} \cdot (\mathbf{v} \times \mathbf{u}) = 0$.

- For any $\mathbf{u}, \mathbf{v} \in \mathbb{R}^3$, $\mathbf{v} \cdot (\mathbf{u} \times \mathbf{u}) = 0$.

Lines and Planes

- For any line in $\mathbb{R}^3$ and a point not on that line, there is exactly one plane that contains both the line and the point.

- For any line in $\mathbb{R}^3$ and a point not on that line, there is exactly one plane that is normal to the line and contains the point.

- For any two non-intersecting lines in $\mathbb{R}^3$, there is exactly one plane that contains one line but not the other.

- If there is no solution t to the equation $u_0 + t\mathbf{u} = v_0 + t\mathbf{v}$ then the lines given by $\{u_0 + t\mathbf{u} : t \in \mathbb{R}\}$ and $\{v_0 + t\mathbf{v} : t \in \mathbb{R}\}$ do not intersect.

- The intersection of a cone and a plane is always an ellipse.

Vector Functions

- If $|\mathbf{r}(t)| = 1$ for all t, then $|\mathbf{r}'(t)|$ is constant.

- Different parametrizations of the same curve result in identical tangent vectors at a given point on the curve.