Calculus IIIA practice exam for mid-term 1

Instructor: Chia-Fu Yu
September 26, 2000

There are 8 problems in this practice exam. They will help you drill your skills about the materials. The actual exam will consist of problems fewer than this one.

1. Find dy/dx and d^2y/dx^2 for the curve $x = 1 + t^2$, $y = t \ln t$.
2. Find the equation of the tangent line of the curve
$$x = \ln t, \ y = e^{-t}, \ t > 0$$
at the point $(0, e^{-1})$.
3. Find the area bounded by the curve
$$x = t - \frac{1}{t}, \ y = t + \frac{1}{t}$$
and the line $y = 2.5$.
4. Find the surface area generated by rotating the curve
$$x = e^t - t, \ y = 4e^{t/2}, \ 2 \le t \le 4$$
about x-axis.
5. Find the area of one loop of the curve
$$r = \cos 4\theta$$
in polar coordinates.
6. Find the arc length of the curve
$$r = e^{-\theta}, \ \theta \ge 0$$
in polar coordinates.
7. Let $C : x^2 + \ldots$ ... ... be a conic section. Find the center, all vertices, foci ... and if it is a hyperbola, then find the ... ... If it is a parabola, then find the directrix. Sketch the graph.
8. Find the area inside both curves
$$r = \sin 2\theta, \ r = \sin \theta$$
in polar coordinates.