Math 101B Test #4 Spring 2007 Name_____

All 9 problems are worth 11 points each. That is: 4 points for setting the problem up correctly, 4 points for doing the algebra and calculus correctly, and the last 3 points for finding each exact answer (like $\sqrt{11}$) instead of a decimal approximation (like 3.31662479) or simplifying an algebraic expression answer. DO NOT USE DECIMAL APPROXIMATIONS!

1. Parametric Equations: Using $0 \leq t \leq 1$, find parametric equations for the line segment from $(4, -3)$ to $(2, 9)$.

2. Calculus and Parametric Equations: Using L'Hopital's Rule correctly, find the slope of the tangent line at $t = \dfrac{\pi}{2}$ for the parametric curve

$$x = \cos 2t,\ y = \sin 3t$$

3. Calculus and Parametric Equations: Find the slope(s) of the graph of the following parametric equations at (0, 0).

$$x = t^3 - t,\ y = t^4 - 5t^2 + 4$$

4. Calculus and Parametric Equations: Without using `fnInt`, find the *exact* area enclosed by the parametric curve $x = 6\cos t,\ y = 2\sin t$.

5. Arc Length: Without using `fnInt`, find the *exact* value of the arc length of the parametric curve $x = t^2 \cos t,\ y = t^2 \sin t, \quad -1 \leq t \leq 1$.

6. Polar Coordinates: Use trigonometry and algebra to change the polar equation $r = 3\sin\theta$ into an x-y equation of the form $(x-h)^2 + (y-k)^2 = r^2$.

7. Calculus and Polar Coordinates: Use integration to find the exact area of the region bounded by $r = 2 - 2\cos\theta$.

8. Calculus and Polar Coordinates: Use integration to find the exact arc length of the curve given by $r = 2 - 2\sin\theta$.

9. Find an equation for the set of points in the x-y plane such that the difference of the distances to the points $(2, 2)$ and $(6, 2)$ equals 2.