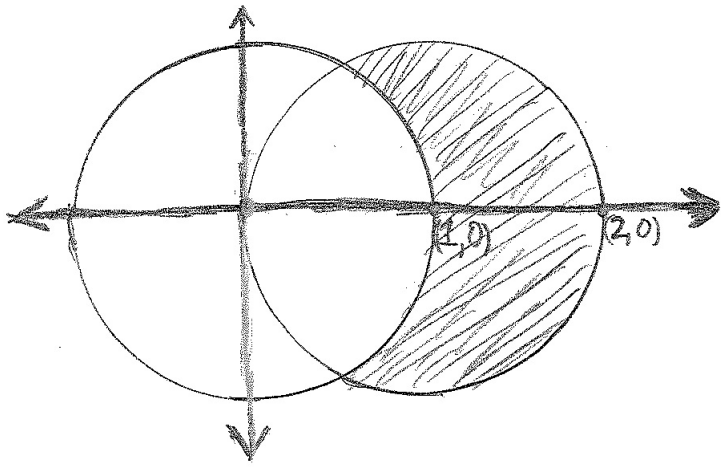
MATH 1953 Practice Midterm 1

Name: _____

Instructions: Please answer each question as completely as possible, and show all work unless otherwise indicated. You may use an approved calculator for this quiz. (Approved: non-graphing, non-programmable, doesn't take derivatives)

1. Find the equations of both tangent lines to the parametric curve $x = t^2$, $y = 2t^5 - 8t^3$ at the intersection point $(4, 0)$.

2. Find the area of the region inside the curve $r = 2\cos\theta$ and outside the curve $r = 1$ (see picture below).



3. Find the length of the polar curve $r = \sin\theta + \cos\theta$ between $\theta = 0$ and $\theta = \frac{\pi}{2}$.

4. Find the following limits using L'Hospital's Rule:

(a) $\lim_{x \to 1} \dfrac{x^3 - 1}{x^5 - 1}$

(b) $\lim_{x \to -\infty} x^2 e^x$

(c) $\lim_{x \to \infty} x^{1/x}$