

Math 130, Section &E4, Fall 2001
Exam 3, November 16

SHOW ALL WORK TO QUALIFY FOR FULL CREDIT.
MAXIMUM POSSIBLE SCORE: 100 POINTS

1. 30 points Find the first three nonzero terms in the MacLaurin series (i.e., the Taylor series about $x = 0$) of the functions
 - (a) 15 points $f(x) \stackrel{\text{def}}{=} \frac{1}{\sqrt{x+3}}$
 - (b) 15 points $f(x) \stackrel{\text{def}}{=} xe^{-x^2}$.
2. 15 points Find the arc length of the curve $y = x^2 - \frac{1}{8} \ln x$ from $x = 1$ to $x = 2$
3. 25 points Consider the parametric curve $x(t) = e^t$, $y(t) = e^{-2t}$
 - (a) 10 points Eliminate the parameter t
 - (b) 15 points Find the area under the curve from $t = 0$ to $t = 3$.
4. 30 points Consider the curve given in polar coordinates by

$$r(\theta) \stackrel{\text{def}}{=} \theta^2$$

for $0 < \theta < 2\pi$.

- (a) 15 points Find the arc length of this curve.
- (b) 15 points Find the area between the origin and the curve with $0 \leq \theta \leq \pi/2$.