

MATH 141, FALL 2008, MIDTERM 1 - REVIEW

1) Find the value of the following limit, if it exists:

$$\lim_{x \rightarrow \infty} \left(1 + \frac{1}{x^2}\right)^x.$$

If the limit does not exist, explain why.

2) Let  $f(x) = 1/(1-x^2)^{1/4}$ , and let  $R$  be the region between the graph of  $f$  and the  $x$  axis on  $[0, 1/2]$ . Find the volume  $V$  of the solid obtained by revolving  $R$  about the  $x$  axis.

3) Find the length of a curve given parametrically by

$$x = f(t) = e^t \sin(t)$$

and

$$y = g(t) = e^t \cos(t),$$

for  $0 \leq t \leq \pi/2$ .

4) Evaluate the integral:

$$\int e^x (1 - e^{2x})^{-0.5} dx$$

5) A swimming pool has the shape of a right circular culinder with radius 10 feet and depth 8 feet. If the pool contains 5 feet of water, what is the work required to pump all the water to the top of the pool?