Math 129 - Section 017
Practice Problems for Test 2

This is not a comprehensive practice test. Other topics may appear on the test. In particular, be sure that you can solve all of the homework problems and all of the problems on the handouts given in class.

1. Determine whether the following integrals converge. Use an **inequality** to support your answer. (It is not sufficient to say, "the integrand behaves like. . .")

   a. $\displaystyle\int_2^\infty \frac{dt}{\sqrt{t^3+1}}$

   b. $\displaystyle\int_0^\infty \frac{dz}{e^z+2^z}$

2. Use an integral to compute the volume of a sphere of radius 4. Draw a clear picture showing all of the important quantities used in your computation.

3. Find the arc length of the graph of $g(x) = (2x+1)^{\frac{1}{2}}$ between $x = 0$ and $x = 2$. Give an approximate answer.

4. The region bounded by the line $y = 1$, the $y-axis$, and the curve $y = x^4$ is rotated about the line $x = 2$. Find the volume of the resulting solid.

5. Do the following sequences converge or diverge? If a sequence converges, find the limit. Otherwise, explain carefully why the sequence diverges.

   a. $s_n = 5 - e^{-4n} + 1$

   b. $s_n = \frac{5n^4-20n^3+1}{n+7n^4+1}$

   c. $s_n = \frac{n}{10} + \frac{5}{10^n}$

   d. $s_n = \frac{(\ln n)^2}{n+1}$

   e. $s_1 = \frac{1}{4}$, $s_n = \sqrt[3]{s_{n-1}}$

   f. $s_1 = \frac{1}{2}$, $s_2 = \frac{1}{2}$, $s_n = (s_{n-1}) \cdot (s_{n-2})$.

6. Give an example of a bounded sequence that does not converge.

7. Compute $\displaystyle\sum_{i=3}^{\infty} \left(\frac{2}{3}\right)^{i-1}$. Show your work, and give an exact answer.