Calculus II Test 2 NAME_____

No books, notes or calculators allowed. Justify your answers by giving appropriate arguments and steps. Circle answers.

1.) A solid is formed by rotating about the x-axis the region between $y = 5 - x^2$ and $y = 1$. Set up, but do not evaluate, the integral that represents the volume of his solid.

2.) Set up, but do not evaluate, the integral that represents the length of the curve $y = \sin x$, $0 \leq x \leq 2\pi$

3.) List (in fractional $\frac{A}{B}$ form) the first five terms in the sequence defined by $a_1 = 1$, $a_{n+1} = 1 + \frac{a_n}{n}$, $n = 1, 2, 3, ...$

4.) Determine whether the sequence converges or diverges. If it converges, find the limit.

(A) $a_n = \frac{3n}{5n+2}$.

(B) $a_n = \frac{(-1)^n n}{n+1}$

5.) Determine whether the following series converge or diverge. If convergent, find the sum of the series.

(A) $\frac{5}{4^1} + \frac{5}{4^2} + \frac{5}{4^3} + \frac{5}{4^4} + ...$

(B) $\sum_{n=0}^{\infty} (0.73)^n$

6.) Determine if the following series are convergent or divergent, and justify your conclusions.

(A) $\sum_{n=1}^{\infty} \frac{5^n}{n!}$

(B) $\sum_{n=1}^{\infty} (-1)^{n+1} \frac{n}{n+100}$

(C) $\sum_{n=1}^{\infty} \frac{n}{n^3+5}$

(D) $\sum_{n=1}^{\infty} (-1)^{n+1} \frac{n}{n^2+5}$

(E) $\sum_{n=1}^{\infty} \frac{n^3}{2^n}$

(F) $\sum_{n=1}^{\infty} \frac{5^n}{3^{2n}}$

7. Use the integral test to determine if the series $\sum_{n=1}^{\infty} \frac{1}{\sqrt{n^3}}$ is convergent or divergent.

Extra Credit: Find a formula for the sum $\sum_{n=0}^{50} r^n = 1 + r + r^2 + \cdots + r^{50}$. You must justify your answer, not just write down a formula.