Math 252 Test Four _____

Calculus II name

This tantalizing fifty minute test covers several sections of *Calculus* by James Stewart 4th ed. Clearly indicate your answers and **show your work**. All parts of problems are five points each (unless otherwise stated).

1. Determine if the following sequences are convergent or divergent. If convergent, then find their limit.

   a) $\left\{\frac{3+(-1)^n}{n^3}\right\}$ b) $a_n = \frac{n^3}{n!}$

2. Determine if the following series are convergent or divergent. Give a reason for your answer.

   a) $\sum_{n=1}^{\infty} \cos(1/n^2)$

   b) $\sum_{n=1}^{\infty} \frac{3}{n^{1.2}}$

   c) $\sum_{n=1}^{\infty} \frac{1}{n^2} \cos\left(\frac{1}{n}\right)$

3. For which values of x does the series $\sum_{n=1}^{\infty} \left(\frac{x-2}{3}\right)^n$ converge?.

4. Determine if the following series are convergent or divergent. If convergent, then find their sum.

a) $\sum_{n=0}^{\infty} \frac{5^n - 4^n}{9^n}$

b) $\sum_{n=1}^{\infty} \ln \frac{n}{n+1}$

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

d) $\sum_{n=1}^{\infty} 3$

5. Consider the parabola $(x+3)^2 = 4(y-5)$. Find the following. (3 points each)

a) vertex

b) focus

c) directrix

6. Find the arc-length of the curve: $r = 3^{\theta}$ $(0 \leq \theta \leq 2\pi)$. (10 points)

7. Sketch the curve: $r = 7 \cos 3\theta$.

8. Find the area enclosed by one lobe (loop) of the curve: $r = 7 \cos 3\theta$. (10 points)