Math 126 **Check-Up Quiz on Chapter 3** **Spring 2012**

Write neat, concise, and accurate solutions to each problem. No calculators are allowed.

1. Find the limit of the sequence $\left\{\dfrac{3n-1}{\sqrt{2n^2-n+4}}\right\}$.

2. Find the limit of the sequence $\left\{\left(\dfrac{2n+1}{2n}\right)^n\right\}$.

3. Find the limit of the sequence $\left\{4\sqrt[n]{7}-\sqrt[n]{n^2}\right\}$.

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

5. Give an example of a decreasing sequence that does not converge.

6. Give an example of a convergent sequence that is not monotone.

7. Give an example of a divergent series whose terms converge to 0.

8. Find the sum of the series $\quad 8-6+\dfrac{9}{2}-\dfrac{27}{8}+\cdots$.

9. Find the sum of the series $\quad \displaystyle\sum_{k=1}^{\infty}\frac{3^{k-1}}{5^{2k}}$.

10. Consider the sequence $\{a_n\}$ defined by $a_1=1$ and $a_{n+1}=7-\dfrac{3}{a_n}$ for each $n\geq 1$. Use mathematical induction to prove that $\{a_n\}$ is an increasing sequence.

11. Determine whether or not the series $\displaystyle\sum_{k=2}^{\infty}\frac{1}{\ln k}$ converges.

12. Determine whether or not the series $\displaystyle\sum_{k=1}^{\infty}\frac{2k-1}{k^3+5k-2}$ converges.

13. Classify the series $\displaystyle\sum_{k=1}^{\infty}\frac{(-1)^{k+1}}{4k+1}$ as absolutely convergent, conditionally convergent, or divergent.

14. Determine whether or not the series $\displaystyle\sum_{k=1}^{\infty}\frac{(2k)!}{7^k(k!)^2}$ converges.

15. Find a power series centered at 0 that represents the function $f(x)=\dfrac{x}{1-x^2}$.

16. Find the interval of convergence for the power series $\displaystyle\sum_{k=0}^{\infty}\frac{(-1)^{k+1}}{3^k(5k+2)}(x-4)^k$.