- Please see the course webpage for the answer key.

1. Find the **sum** of the following series $\sum_{n=1}^{\infty}(-1)^n \frac{6^{n+1}}{5^{3n-1}}$

2. Use the **Integral Test** to **determine** and **state** whether the series $\sum_{n=1}^{\infty} \frac{\ln n}{n^2}$ Converges or Diverges. Justify all of your work. You can skip the 3 preconditions.

3. Consider the series $\sum_{n=1}^{\infty} \frac{1}{n^2+4n+7}$

Use two Different methods, namely the Integral Test (no pre-Condition check needed) and the Comparison Test, to prove that this series Converges.

In each case determine whether the given series **Converges**, or **Diverges**. Name any Convergence Test(s) you use, and justify all of your work.

4. $\sum_{n=1}^{\infty} n^6+7$

5. $\sum_{n=1}^{\infty} \frac{n^6+7}{n^6+1}$

6. $\sum_{n=1}^{\infty} \frac{1}{n^6+1}$

7. $\sum_{n=1}^{\infty} \frac{n^6+7}{n^7+1}$

8. $\sum_{n=1}^{\infty} \frac{n+6}{n^7+1}$

9. $\sum_{n=1}^{\infty} \frac{5}{n^6}+\frac{5^n}{6^n}$

10. $\sum_{n=2}^{\infty} \frac{n^6}{\ln n}$

11. $\sum_{n=1}^{\infty} \frac{\ln 6}{n^6}$

12. $\sum_{n=1}^{\infty} \frac{1}{6^{2n}}$

13. $\sum_{n=1}^{\infty} \left(\frac{6}{\pi}\right)^n$

14. $\sum_{n=1}^{\infty} \frac{\pi}{6}$

15. $\sum_{n=1}^{\infty} \frac{\pi}{6^n}$

16. $\sum_{n=1}^{\infty} \arctan(6n)$

17. $\sum_{n=1}^{\infty} \frac{\sin^2 n}{n^6+1}$

18. $\sum_{n=1}^{\infty} \left(1-\frac{2}{n^6}\right)^{n^6}$