

- 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.

3. In each case determine whether the given series **converges**, or **diverges**. Name any convergence test(s) you use, and justify all of your work.

a. $\sum_{n=1}^{\infty} \frac{n^3}{n^7 + 2n + 3}$

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

c. $\sum_{n=4}^{\infty} \frac{n}{n^{\frac{3}{2}} - 6}$

d. $\sum_{n=1}^{\infty} \frac{3n^4 + n - 1}{n^5 + n^2 + 3}$

e. $\sum_{n=1}^{\infty} \frac{n^2 + \sqrt{n}}{n^7 + 9}$

f. $\sum_{n=1}^{\infty} (-1)^n \frac{(2n)!}{5^n (n!)^2}$