Convergence of Series IV - Answer Key

1. Is $\sum_{n=1}^{\infty}\left(\frac{8}{2^n}+\frac{1}{n}\right)$ convergent? Why?

   No, because $\sum_{n=1}^{\infty}\frac{1}{n}$ is divergent.

2. Is $\sum_{n=0}^{\infty}\frac{1}{n^2+n}$ convergent? Why?

   Yes, by the comparison test.

3. Is $\frac{1}{3}-1+3-9+27-\cdots$ convergent? Why?

   No, the first and second conditions of AST are not satisfied.

4. Is $\sum_{n=0}^{\infty}(0.9)^n-(0.2)^n$ convergent? Why?

   Yes, both the series are convergent geometric series.

5. Is $\sum_{n=1}^{\infty}\frac{1}{\sqrt{n}(\sqrt{n}+e^{-n})}$ convergent? Why?

   No, by the comparison test.

6. Is $\sum_{n=1}^{\infty}\frac{1}{n^{3-\cos(n)}}$ convergent? Why?

   Yes, by the comparison test.

7. Is $\sum_{n=2}^{\infty}\frac{\sin(n\pi)}{\sqrt{n^2+1}}$ convergent? Why?

   Yes, by AST.

8. Is $\sum_{n=2}^{\infty}\frac{1}{n(\ln(n))^2}$ convergent? Why?

   Yes, by the integral test.

9. Is $\sum_{n=0}^{\infty}\frac{(-1)^n e^{\frac{1}{\sqrt{n}}}}{n^2}$ convergent? Why?

   Yes, by AST.

10. Is $\sum_{n=0}^{\infty}\frac{1}{n^{1+\frac{1}{\sqrt{n}}}}$ convergent? Why?

    No, by the integral test.
