Name: ———————————————————————————   ————— **/ 25**

30 minutes maximum. 25 possible points. No aids (book, calculator, etc.) are permitted Show all work and use proper notation for full credit. Answers should be in reasonably-simplified form.

1. **[12 points]** Use the comparison test or the limit comparison test to determine if the series converges or diverges. A complete answer includes (i) which test you are using, (ii) a clear application of the test, and (iii) a conclusion drawn from the test.

a. $\displaystyle\sum_{n=1}^{\infty} \frac{n!}{(n+2)!}$

b. $\displaystyle\sum_{n=1}^{\infty} \frac{\ln(n)}{n^2}$

c. $\displaystyle\sum_{n=1}^{\infty} \frac{\sin^2(n)}{5^n}$

2. **[12 points]** Do the series converge absolutely, conditionally, or neither (diverge)? A complete answer includes (i) which test(s) you are using, (ii) a clear application of the test(s), and (iii) a circled answer.

a. $\displaystyle\sum_{n=1}^{\infty} \frac{(-2)^n}{\ln(n)}$

CONVERGES	CONVERGES	DIVERGES
ABSOLUTELY	CCONDITIONALLY	

b. $\displaystyle\sum_{n=1}^{\infty} \frac{(-1)^{n+1}}{\sqrt{n+2}}$

CONVERGES   CONVERGES   DIVERGES
ABSOLUTELY   CCONDITIONALLY

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

CONVERGES CONVERGES DIVERGES
ABSOLUTELY CCONDITIONALLY

3. [1 points] The sum of the convergent series $\displaystyle\sum_{n=1}^{\infty} \frac{(-1)^{n+1}}{2n+1}$ is estimated by its 50th partial sum

$S_{50} = \displaystyle\sum_{n=1}^{\infty} \frac{(-1)^{n+1}}{2n+1} = 0.2097003$. Estimate how close S_{50} is to the sum of the series $\displaystyle\sum_{n=1}^{\infty} \frac{(-1)^{n+1}}{2n+1}$.