

Unit 5 REVIEW A

1) Find the limit of each sequence.

a) $\lim_{n \rightarrow \infty} \frac{\sin^2 n}{n!} =$ _____

b) $\lim_{n \rightarrow \infty} \frac{2n}{\sqrt{n^2 + 1}} =$ _____

c) $\lim_{n \rightarrow \infty} \frac{n^2 \cdot n!}{(n+2)!} =$ _____

d) $\lim_{n \rightarrow \infty} \frac{\ln n}{n} =$ _____

e) $\lim_{n \rightarrow \infty} \frac{e^{n+5}}{3^n} =$ _____

f) $\lim_{n \rightarrow \infty} [\ln(2n) - \ln(n+1)] =$ _____

g) $\lim_{n \rightarrow \infty} \frac{\sqrt{3n^6}}{7n^3 + 10n} =$ _____

h) $\lim_{n \rightarrow \infty} \frac{3}{5^{n-1}} =$ _____

i) $\lim_{n \rightarrow \infty} \frac{(n+3)!}{6n \cdot (n+2)!} =$ _____

j) $\lim_{n \rightarrow \infty} \frac{10n}{(\ln n)^2} =$ _____

2) Evaluate each integral.

a) $\int_1^{\infty} \frac{1}{(3x+1)^2} dx$

b) $\int_0^1 \frac{3}{\sqrt{x}} dx$

c) $\int_0^1 \frac{7}{x^{1/2}} dx$

d) $\int_1^{\infty} \frac{e}{x} dx$

3) Determine whether each improper integral is convergent or divergent. **If convergent, find its value.**

a) $\int_0^1 \frac{3}{x^{.5}} dx$ C ____ D ____

b) $\int_1^{\infty} \frac{5}{\sqrt{x}} dx$ C ____ D ____

- 4) Determine whether each series converges or diverges. Justify each answer.
If it converges, give the sum if you can or state that you can't.

a) $\sum_{n=1}^{\infty} \left(\frac{-1}{e}\right)^n$

C ____ D ____

b) $\sum_{n=1}^{\infty} \frac{5}{n}$

C ____ D ____

c) $\sum_{n=1}^{\infty} \frac{(-1)^n}{3^{n-1}}$

C ____ D ____

d) $\sum_{n=1}^{\infty} \frac{n^6 + 1}{n^8}$

C ____ D ____

e) $\sum_{n=1}^{\infty} \left(1 + \frac{1}{n}\right)^n$

C ____ D ____

f) $\sum_{n=1}^{\infty} \frac{n^7}{100n^7 + 7n}$

C ____ D ____

g) $\sum_{n=1}^{\infty} \frac{2^n \cdot 3^{n-1}}{5^n}$

C ____ D ____

h) $\sum_{n=2}^{\infty} \frac{1}{n(\ln n)^2}$

C ____ D ____