

## MATH 2132 Tutorial 2

In Problems 1–4, determine whether the sequence of functions  $\{f_n(x)\}$  has a limit.

1.  $f_n(x) = \frac{n^2x^2 + 2nx}{3n^2x + 5}, -\infty < x < \infty$

2.  $f_n(x) = \frac{\sin nx}{nx}, x > 0$

3.  $f_n(x) = \frac{n \sin(x/n)}{x}, x > 0$

4.  $[\ln(x^{n+1})]^{1/n}, x > 1$

In problems 5–12, determine whether the series of constants converges or diverges. Justify your answer. Find the sum of any convergent series.

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

6.  $\sum_{n=2}^{\infty} \left(-\frac{7}{3}\right)^{n+1}$

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

8.  $\sum_{n=3}^{\infty} \left(1 + \frac{1}{n}\right)^n$

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

10.  $\sum_{n=1}^{\infty} (-e)^{-n}$

11.  $\sum_{n=100}^{\infty} \frac{1}{n} \text{Tan}^{-1}n$

12.  $\sum_{n=1}^{\infty} \frac{1}{n^2 + n}$  Hint: Find the sequence of partial sums.

**Answers:** 1.  $x/3$  2. 0 3. 1 4. 1 5. Diverges 6. Diverges 7. 15552/13  
8. Diverges 9. 154/1891 10.  $-1/(e+1)$  11. Diverges 12. 1