MATH 1132 – Calculus II March 20, 2018

# Practice Exam 2

*No calculators. Show your work. Clearly mark each answer.*

1. Find the limits of the following sequences $\{a_n\}$.

   (a)
   $$a_n = \frac{2n^2 - n + 1}{3n^3 + 5}$$

   (b)
   $$a_n = \frac{\cos n}{\sqrt{n}}$$

   (c)
   $$a_n = \frac{5n^2 - n + 1}{2n^2 + 5}$$

2. Which of the following series converge or diverge? Give reasons to your answers.

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

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

   (c)
   $$\sum_{n=0}^{\infty} (-1)^n \frac{n}{n+1}$$

   (d)
   $$\sum_{n=1}^{\infty} \frac{n^2}{n!}$$

3. Using partial fractions show that the following improper integral converges.
   $$\int_1^{\infty} \frac{dx}{x(x+1)}$$
   What can you say about convergence of the following series?
   $$\sum_{n=1}^{\infty} \frac{1}{n(n+1)}$$

4. Express the following number as a ratio of two integers.
   $$1.13131313\ldots$$

5. Find the value of the following series
   $$\sum_{n=2}^{\infty} \frac{2}{5^n}.$$