MATH 1452-006 Exam III 17 April 2015

Answer the problems on separate paper. You do not need to rewrite the problem statements on your answer sheets. Work carefully. Do your own work. **Show all relevant supporting steps!**

Bald solutions to problems – answers without accompanying, supporting work – will receive ***no*** credit.

For each problem choose **1** (one, uno, eins, un) of the 2 options.

1. (13 pts) Choose one. Determine whether the series converges or diverges. Show all supporting work.

   a. $\displaystyle\sum_{k=1}^{\infty} \frac{k+2}{10k+9}$ b. $\displaystyle\sum_{k=1}^{\infty} \frac{k+2^k}{2k+4^k}$

2. (13 pts) Choose one. Determine whether the series converges or diverges. Show all supporting work.

   a. $\displaystyle\sum_{k=1}^{\infty} \frac{k2^k}{(k+1)!}$ b. $\displaystyle\sum_{k=1}^{\infty} \frac{2^k k!}{(2k)!}$

3. (13 pts) Choose one. Determine whether the series converges or diverges. Show all supporting work.

   a. $\displaystyle\sum_{k=2}^{\infty} \frac{k}{\sqrt{k^3-2}}$ b. $\displaystyle\sum_{k=1}^{\infty} \frac{\sqrt{2k}}{3k^2+7k}$

4. (11 pts) Choose one. Find the sum of the series, if it exists. Show all supporting work.

   a. $\displaystyle\sum_{k=1}^{\infty} \frac{7(-2)^k}{3^k}$ b. $\displaystyle\sum_{k=2}^{\infty} \frac{3^k}{2(5^k)}$

5. (11 pts) Choose one. Compute the limit of the sequence, if it exists. Show all supporting work.

   a. $\left\{\dfrac{1-5n^2}{n^3+8n}\right\}$ b. $\left\{\dfrac{n+2}{\sqrt{n^3+n}}\right\}$

6. (11 pts) Choose one. Find $\dfrac{dy}{dx}$. Simplify where possible.

   a. $y = \sinh^{-1}(\tan x)$ b. $y = \tanh^{-1}(\sin x)$

7. (11 pts) Choose one. Find $\dfrac{dy}{dx}$. Simplify where possible.

   a. $y = \tanh(4\sqrt{x})$ b. $y = \sinh(\ln x)$

8. (11 pts) Choose one. Compute the value of definite integral, if it exists.

   a. $\displaystyle\int_0^1 \frac{x}{\sqrt{1-x^2}}\,dx$ b. $\displaystyle\int_0^{\infty} xe^{-x^2}\,dx$

9. (11 pts) Choose one. Find the general solution of the first order, linear differential equation.

   a. $\dfrac{dy}{dx}+\dfrac{2}{x}y=\sqrt{x}+1$ b. $\dfrac{dy}{dx}-\dfrac{1}{x}y=\sqrt{x}-1$