Name: _____

ID: _____

Instructor: _____

Section: _____

1. Solve all questions and write your solution in clean, legible way.

2. Scan the papers on which the solution is written into a single PDF file.

3. The PDF file should be named as follows: LastName_FirstName_ID.

4. Upload the PDF file to Moodle before the deadline.

5. No late submissions will be allowed.

Question 1. [**10 %**] Determine whether the following sequence converges or diverges

$$a_n = \ln(4n \sin \frac{4}{n})$$

Question 2. [**10%**] Find the length for $1 \le y \le 4$ of the curve

$$x = \frac{2}{5} y \sqrt[4]{y} - \frac{2}{3} \frac{y}{\sqrt[4]{y}}.$$

Question 3. [**40%**] Determine whether the following series converge or diverge. Find its sum if possible.

(a) $\displaystyle\sum_{n=3}^{\infty} \frac{2}{n^2 + 6n + 8}$

(b) $\displaystyle\sum_{n=3}^{\infty} \frac{\cos(2n) + 3}{n\sqrt{n+1}}$

(c) $\displaystyle\sum_{n=3}^{\infty} \frac{3^n - 4}{\pi^n + n}$

(d) $\displaystyle\sum_{n=3}^{\infty} \frac{\ln n + \sqrt{n}}{n^3 - 4}.$

Question 4. [**40%**]. Let R be the region enclosed by $y = \sqrt{x}$, $y = 2 - x$ and $y = 2$.
(a) Use integration with respect to x to find the area A of R.
(b) Set up the area A with respect y (**do not integrate**).
(c) Find the volume of revolving the region R around $y = 2$ **using two different methods**.