Midterm 2 Mock Exam. Math 231 BD3. Spring 2015. 3/13/2015.

Multiple Choice Questions:

1. What number do we get if we approximate the integral $\int_0^2 x^2\,dx$ using the trapezoidal method with 4 intervals ?

(A) $\frac{13}{4}$ (B) $\frac{15}{4}$ (C) $\frac{11}{4}$ (D) $\frac{9}{4}$ (E) $\frac{7}{4}$

Determine whether each of these series diverge or converge and if it converges to which value:

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

(A) $\frac{25}{13}$ (B) $\frac{23}{15}$ (C) $\frac{29}{13}$ (D) $\frac{27}{11}$ (E) Diverges

3. $\sum_{n=5}^{\infty} \frac{6}{9n^2+6n-8}$:

(A) $\frac{29}{208}$ (B) $\frac{24}{143}$ (C) $\frac{20}{99}$ (D) $\frac{28}{187}$ (E) Diverges

Determine whether each of these series diverge or converge:

4. $\sum_{n=2}^{\infty} \frac{1}{n\ln(n)\ln(\ln(n))}$:

(A) Converges (B) Diverges

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

(A) Converges (B) Diverges

6. $\sum_{n=0}^{\infty} \frac{1}{n^2-1}$:

(A) Converges (B) Diverges

7. $\lim_{n\to\infty} \frac{n!}{4^n}$:

(A) Converges (B) Diverges

8. $\sum_{n=1}^{\infty} \sin(\frac{1}{n})$:

(A) Converges (B) Diverges

9. True or False: If $\sum_{n=1}^{\infty} a_n$ converges, then the sequence $\{s_n\}_{n=1}^{\infty}$ converges, $(s_n = a_1 + a_2 + ... + a_n)$

(A) True (B) False

Free Response:

10. Consider the lamina L in the plane of constant density ρ, which is bounded by the curves

$$x = 5 - y^4, \qquad x = y^2 - 1.$$

Find the moments M_x and M_y and the center of mass of L.

11. We have a triangle shaped swimming pool formed by the lines $y = -2x$ $y = 0$ and $x = 5$, which is completely filled up with water. Draw a picture of the pool and find the hydrolic force of the water at the bottom.

12. Let $y = \sqrt{x-1}$ from $x = 1$ to $x = 10$. Set up but **do not evaluate** the following:

a) The arc length of the curve

b) The surface area when rotated around the x-axis where the intergral has to be in terms of x.

c) The surface area when rotated around the x-axis where the intergral has to be in terms of y.

d) The surface area when rotated around the y-axis.

13. Suppose the sum of the series $s = \sum_{k=1}^{\infty} \frac{1}{k^3}$ is approximated by its 5th partial sum, $s_5 = 1 + \frac{1}{8} + ... + \frac{1}{125}$. Approximate the maximum possible error in this estimation.