

DIGITLE – BC CALCULUS

Puzzle 204 – Improper Integrals



Directions: The first 5 problems have single digit or letter answers. The 6th problem has a 3-digit answer (counting leading zeros if present). You have a choice: solve the easier single-character answer problems or tackle the more difficult 3-digit answer and the multiple choice. Once you have done that, attempt to solve the puzzle by entering the following url on your computer, tablet, or phone: <https://mastermathmentor.com/mmm/digitle.ashx>.

The correct puzzle answer will be the digits/letters of your answer(s) scrambled. Use the following interpretation. You get 6 tries. Problems should be done without graphing calculators.

- Green :** the digit is in the answer and is in the correct spot. **Grey :** the digit is not in the answer.
Yellow: the digit is in the answer but is not in the correct spot.

Single Digit or Letter Answers:

1) $\int_0^{\infty} \frac{8e^x}{(1+e^x)^2} dx =$

2) $\int_e^{\infty} \frac{12}{x(\ln x)^2} dx =$

3) Which of the following integrals are convergent?

I. $\int_1^{\infty} \frac{3}{4x} dx$

II. $\int_1^{\infty} \frac{3}{x^4} dx$

III. $\int_1^{\infty} \frac{1}{\sqrt[3]{x^4}} dx$

- A. I and II only B. I and III only C. II and III only D. I, II, and III

4) Which of the following integrals is convergent?

I. $\int_{-9}^0 (x+1)^{-1/3} dx$

II. $\int_{-9}^0 (x+1)^{-2/3} dx$

III. $\int_{-9}^0 (x+1)^{-5/3} dx$

- A. I and II only B. I and III only C. II and III only D. none converge

5) The region bounded by $y = \frac{10}{\sqrt{\pi \cdot x}}$, the line $y = 50$ and the y -axis is rotated about the y -axis. Find the volume of the solid generated.

Three Digit Answer:

6) The region above the x -axis of $y = xe^{-x}$ as shown in the figure to the right is the base of a 3-D solid. Cross sections of the solid perpendicular to the x -axis are isosceles right triangles with the base as one of the legs of the triangle. Find the volume of the solid.

