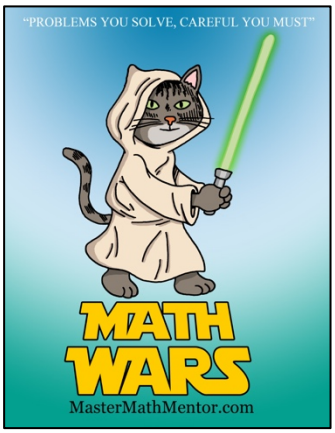
Math Wars – AB Calculus
Scrambled 187 – Integrals and Applications



Maximum Time: 7.5 Minutes

Directions: To start, you need to download the Math Wars application on your cell phone: Use the QR code or the url: https://mastermathmentor.com/mmm/mathwars.ashx?key=187

When ready, start the timer and then solve the problems below, entering your choice, A, B, C, D and pressing Submit for each problem when you are sure of your answer. When complete, stop the timer. You will see problems you got correct in green and incorrect in red. You will receive a score based on how many problems you got right and your time. A perfect score is all problems correct using half the maximum time or less. You can text or email your friends with your results.

1. (1 pt) If $a > 0$, find $\int_{-a}^{a} \left(2x - x^2\right) dx =$

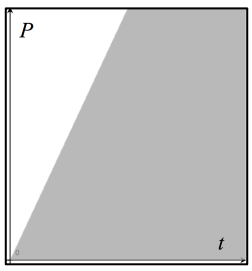
A. 0 B. $2a^2$ C. $\frac{-2a^3}{3}$ D. $2a^2 - \frac{2a^3}{3}$

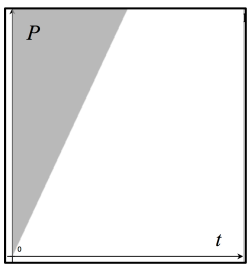
2. (3 pts) Which of the following differential equations are separable?

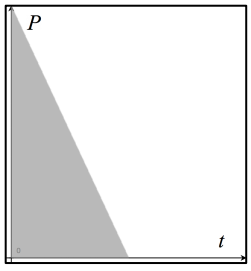
I. $\frac{dy}{dx} = x^2 - 2xy + y^2$ II. $\frac{dy}{dx} = 2xy - 8x + 3y - 12$ III. $\frac{dy}{dx} = e^{x+y+1}$

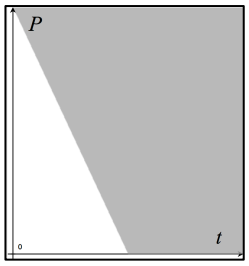
A. I and II only B. I and III only C. II and III only D. Only one of them

3. (5 pts) The change in population P is inversely proportional to $P - 2t$ where the constant of proportionality is positive. Which of the shaded regions below describe when the population is decreasing.

A. 

B. 

C. 

D. 

4. (7 pts) The function f is continuous on the closed interval [–10, 10] and has the values given in the table. The trapezoidal approximation for $\int_{-11}^{9} f(x)\,dx$, found with 5 subintervals, is zero. Find the trapezoidal approximation for $\int_{1}^{9} f(x)\,dx$, found with 2 subintervals.

x	–11	–7	–3	1	5	9
$f(x)$	–4	k	3	$k+1$	$2k$	16

A. –12 B. 4 C. 9 D. 19

5. (9 pts) If $f(x) = \int \frac{6x-2}{\sqrt{x}}\,dx$, find the average rate of change of f on [4, 9].

A. $\frac{72}{5}$ B. 15 C. $\frac{19}{3}$ D. 16