

AP Calculus Homework 14

Please write your answer on a separate piece of paper and submit it on Classkick or write your answer directly on Classkick.

Please write all answers in exact forms. For example, write π instead of 3.14.

Questions with a * are optional. Questions with ** are optional and more challenging.

1. Determine whether each integral is convergent or divergent. Evaluate those that are convergent.

a) $\int_2^3 \frac{1}{\sqrt{3-x}} dx$ b) $\int_{-2}^{14} \frac{1}{\sqrt[4]{x+2}} dx$ c) $\int_6^8 \frac{1}{(x-6)^3} dx$
d) $\int_0^3 \frac{1}{x^2-6x+5} dx$ e) $\int_{-1}^0 \frac{e^{1/x}}{x^3} dx$ f) $\int_0^2 z^2 \ln z dz$
g) $\int_0^1 \frac{\ln x}{\sqrt{x}} dx$

2. Find the area of the region.

a) $y = \sin x$, $y = e^x$, $x = 0$, $x = \pi/2$ b) $y = x$, $y = x^2$
c) $y = 1/x$, $y = 1/x^2$, $x = 2$ d) $y = \tan x$, $y = 2 \sin x$, $-\pi/3 \leq x \leq \pi/3$
e) $y = \sqrt{x}$, $y = \frac{1}{2}x$, $x = 9$

3. Use Calculus to find the area of the triangle with the given vertices.

$(0, 0)$, $(2, 1)$, $(-1, 6)$

4. Evaluate the integral and interpret it as the area of a region.

$$\int_0^{\pi/2} |\sin x - \cos 2x| dx$$

5. Find the values of c such that the area of the region bounded by the parabolas $y = x^2 - c^2$ and $y = c^2 - x^2$ is 576.

6. The area of the region enclosed by the graph of $y = x^2 + 1$ and the line $y = 5$ is

(A) $\frac{14}{3}$ (B) $\frac{16}{3}$ (C) $\frac{28}{3}$ (D) $\frac{32}{3}$ (E) 8π

7. What is the area of the region between the graphs of $y = x^2$ and $y = -x$ from $x = 0$ to $x = 2$?

- (A) $\frac{2}{3}$ (B) $\frac{8}{3}$ (C) 4 (D) $\frac{14}{3}$ (E) $\frac{16}{3}$