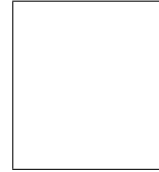




Quiz # 10
Math 101-Section 06 Calculus I
19 April, 2018, Thursday
Instructor: Ali Sinan Sertöz
Solution Key



Bilkent University

Name:

Department:

Student ID:

Q-1) Let $a > 1$ be any real number.

(i) Find and simplify the derivatives of

$$f(x) = \frac{a^{2x}}{2 \ln a}, \text{ and } g(x) = \frac{a^x}{(\ln a)^2}(x \ln a - 1).$$

(ii) Let R be the region bounded by the curves $x = 0$, $x = 1$, $y = 0$ and $y = a^x$. Find the volume of the solid obtained by revolving R around the x -axis.

(iii) Find the volume of the solid obtained by revolving R around the y -axis.

Answer:

(i) $f'(x) = a^{2x}$ and $g'(x) = xa^x$.

(ii)

$$V = \pi \int_0^1 (a^x)^2 dx = \pi \left(f(x) \Big|_0^1 \right) = \pi \frac{a^2 - 1}{2 \ln a}$$

(iii)

$$V = 2\pi \int_0^1 xa^x dx = 2\pi \left(g(x) \Big|_0^1 \right) = 2\pi \frac{a^x(-1 + x \ln(a))}{(\ln(a))^2}.$$