



Name: \_\_\_\_\_ Date: \_\_\_\_\_ Score: \_\_\_\_\_

Solve each problem. Show all work.

CALCULUS I – Worksheet #79

1.	If $f(x) = x^3 + 3x$ with $x = 2$ and $dx = .01$ , then find $dy$
2.	For problem #1, give the approximation for $f(2.01)$ using differentials.
3.	Approximate $\sqrt{24.9} + (24.9)^2$ using differentials.
4.	If the radius of a sphere is drawn as 2 cm but, when measured, it was actually 2.01 cm, then approximate the change in the volume of the sphere.
5.	$\int_0^{\sqrt{3}} \frac{dx}{\sqrt{4-x^2}} = ?$ A) $\frac{\ln 2}{2}$ B) $-\ln 2$ C) $\frac{\pi}{6}$ D) $\frac{\pi}{4}$ E) $\frac{\pi}{3}$
6.	The radius of a circle is increasing at a nonzero rate, and at a certain instant, the rate of increase in the area of the circle is numerically equal to the rate of increase in its circumference. At this instant what is the value of $r$ ? A) $\frac{1}{2}$ B) 1    C) 2    D) 3    E) 4
7.	Let $f$ be the function given by $f(x) = \frac{2x-5}{x^2-4}$ . (a) Find the domain of $f$ . (b) Write an equation for each vertical and each horizontal asymptote for the graph of $f$ . (c) Find $f'(x)$ . (d) Write an equation for the line tangent to $f$ at the point $(0, f(0))$ .
8.	The area that is enclosed by $y = x^3 + x^2$ and $y = 6x$ for $x \geq 0$ is A) $\frac{29}{12}$ B) 3    C) $\frac{16}{3}$ D) 6    E) $\frac{32}{3}$
9.	$f$ and $g$ are functions, where $f$ is increasing on the interval $(-\infty, \infty)$ and $g$ is decreasing $(-\infty, \infty)$ . Which of the following must be decreasing? (A) $f(g(x))$ (B) $g(g(x))$ (C) $f(x) - g(x)$ (D) $f(x) + g(x)$ (E) $f(f(x))$
10.	$\int_0^{\frac{\pi}{4}} \frac{e^{\tan x}}{\cos^2 x} dx$
11.	Let $R$ be the region enclosed by the graphs of $y = e^x$ , $y = x$ , and the lines $x = 0$ and $x = 4$ . a) Find the area of $R$ . b) Find the volume of the solid generated when $R$ is revolved about the $x$ -axis. c) Set up, but <u>do not integrate</u> , an integral expression in terms of a single variable for the volume of the solid generated when $R$ is revolved about the $y$ -axis. (Hint: More than 1 Integral)



Answer key — for instructor use only.

Answers:

1) 0.15	2) 14.15	3) 624.99	4) $.16\pi$	5) E
6) B	7a) all reals except 2 and -2 b) VA: $x = 2$ , $x = -2$ HA: $y = 0$ c) $\frac{2x^2 + 10x - 8}{(x^2 - 4)^2}$ d) $y - 5/4 = (-1/2)x$	8) C	9) A	10) $e^{\int_0^{\pi/4} \tan x} = e - 1$
11a) $e^4 - 9$ b) $\pi \left( \frac{e^8}{2} - \frac{131}{6} \right)$ c) $\pi \int_0^1 y^2 dy + \pi \int_1^4 [y^2 - (\ln(y))^2] dy + \pi \int_4^{e^4} [4^2 - (\ln(y))^2] dy$				