

NAME _____

Rec. Instr., Time _____

CALCULUS I - EXAM III
November 16, 2004

Show all work for full credit.

(8) 1. Find dy for the given function $y = f(x)$. Do not simplify.

a) $y = \sqrt{1 + \sin \sqrt{x}}$.

b) $y = (1 + (2 + 3x)^{\frac{-3}{2}})^{\frac{2}{3}}$.

(6) 2. Set up Newton's iteration scheme to approximate the x coordinate of the intersection of the graphs of $f(x) = x^4$ and $g(x) = x + 3$. Do not simplify.

(6) 3. The diameter d of a sphere is measured to be 18 cm with a maximum possible error of 0.05 cm. Use differentials to approximate the possible propagated error in calculating the surface area of the sphere. (The area of a sphere of radius r is $A(r) = 4\pi r^2$.)

(12) 4. Evaluate the indefinite integrals.

a) $\int \left(\frac{1}{x^2} - \sqrt[3]{x} + 2 \right) dx =$

b) $\int 3 \sin(5x) dx =$

c) $\int \left(\sec^2(t) - \sin(3t) \right) dt =$

(8) 5. Find the function $y = f(x)$ satisfying the initial value problem:

$$f''(x) = x^{-2/3}, \quad f'(4) = 2, \quad f(0) = 6.$$

(10) 6. a) Write the following sum in expanded notation but **do not evaluate it**.

$$\sum_{j=1}^4 (-1)^j \frac{j}{2j+1} =$$

b) Write the following sum in summation (sigma) notation.

$$3 + 7 + 11 + 15 + 19 + \dots + 99 + 103 =$$

(10) 7. a) Write out the Riemann sum $\sum_{i=1}^n f(c_i^*)\Delta x$ for $f(x) = x^2$ on the interval $[0,2]$ using a regular partition into $n = 4$ subintervals with the chosen point c_i^* in the i^{th} interval taken as the right endpoint. (**Do not evaluate the sum.**)

b) Write the definite integral that the Riemann sum in part (a) approximates, and evaluate it.

(12) 8. Evaluate the definite integrals:

a) $\int_{-\pi/2}^{\pi/2} (2t + \cos t) dt =$

b) $\int_1^4 \frac{u-2}{\sqrt{u}} du =$

(8) 9. Sketch the region bounded by the graphs of the equations $y = x^3 + x$, $x = 2$, and $y = 0$, and find its area.

- (12) 10. A ball is thrown vertically upward from a height of 6 ft with an initial velocity of 60 ft per second. How high will the ball go? (The acceleration due to gravity is -32 ft/sec².)

- (10) 10. Let $g(x) = \int_0^x f(t)dt$ where $f(x)$ is the function graphed at left below. Sketch the graph of $g(x)$ over the interval $[0,3]$ at right and find the following.

a) $f'(2) =$ b) $g(1) =$ c) $g(3) =$ d) $g'(2) =$

