

**FINAL (SAMPLE QUESTIONS)**

Show all work, simplify as appropriate, and use “good form and procedure” (as in class).

Box in your final answers; write units where appropriate!

No notes or books allowed.

**USE A SCIENTIFIC CALCULATOR!**

- 1) Approximate the area under the graph of  $f(x) = \ln x$  from  $a = 4$  to  $b = 10$  by finding a Left Riemann Sum using 3 rectangles of the same width. Round off to four decimal places whenever you need to round off. (10 points)

- 2) Find the integrals. Simplify wherever possible. (32 points total)

a)  $\int_1^5 (3x^{-1} - 3x^2) dx$  (6 points)

b)  $\int x(x^2 - 4)^6 dx$  (6 points)

c)  $\int e^{x^3+6x-1}(x^2 + 2) dx$  (6 points)

d)  $\int \frac{\ln x}{x} dx$  (6 points)

e)  $\int_1^2 \frac{x^2}{x^3 + 4} dx$

(8 points)

- 3) The weight of a blob increases at the rate of  $0.3e^{0.2t}$  pounds per day, where  $t$  is measured in days. Find the total increase in the blob's weight from  $t = 3$  to  $t = 6$ . (6 points)

4) Find the average value of  $f(x) = x^3$  on the interval  $[0,3]$ . (6 points)

5) Find the area bounded by the graphs of  $y = 5x^2 + x - 11$  and  $y = 3x^2 - 3x + 5$ .  
(16 points)

**YOU MAY CONTINUE ON THE NEXT PAGE.**

6) Find the domain of  $f(x,y) = \frac{\ln x}{y}$ . (2 points)

7) Let  $f(x,y) = x^2y^3 + e^{xy}$ . (6 points total)

a) Find  $f_x(x,y)$ .

b) Find  $f_x(3,1)$ .

8) Let  $f(x,y,z) = x \ln(2x^3 + 4y) + z^2$ . Find  $f_y(x,y,z)$ . (5 points)

- 9) Let  $f(x,y) = 2x^2 - 6xy - 14x + 3y^2 + 18y + 7$ . Find any critical points, and classify each critical point (as corresponding to a Relative Maximum Point, a Relative Minimum Point, or Neither). Find any relative extreme values. (17 points total)

Note: This problem relates to Section 7.3, which we may or may not cover in our class.