

EXAM 2
Math 115
April 16, 2001

Name _____

1. For each of the following functions find the third derivative. (6 pts each)

(a) $f(x) = 3x^{\frac{2}{3}}$.

(b) $f(x) = \frac{\ln x}{4x}$.

2. Find the slope of the line tangent to the curve $3\sqrt{x} - 2\sqrt{y} = xy$ at the point $(1, 1)$. (9 pts)

3. Find all relative maximum and minimum values for the function $f(x) = 3x^{\frac{5}{3}} - 15x^{\frac{2}{3}}$. (9 pts)

4. Find the absolute maximum and the absolute minimum (if they exist) for the function $f(x) = \frac{1-x}{3+x}$ on the interval $[0, 3]$. (9 pts)

5. Find the interval(s) on which the function $f(x) = x(x+5)^2$ is concave up/down. (9 pts)

6. Find each of the following. (6 pts each)

(a) $\int 3t^2 + e^{3t} dt.$

(b) $\int \frac{1}{x \ln(x)} dx.$

(c) $\int \frac{5x + x^2}{x} dx.$

(d) $\int \frac{3x}{(2x^2 - 7)^4} dx.$

(e) $\int (x^2 - x)e^{(x^3 - \frac{3}{2}x^2)} dx.$

(f) $\int x^2 \sqrt{x^3 - 5} dx.$

7. Your company needs to design cylindrical metal containers with a volume of 16 ft^3 . The top and bottom will be made of a sturdy material that costs \$2 per square foot, while the material for the sides costs \$1 per square foot. Find the radius and the height of the least expensive container. (8 pts)

8. One car leaves a given point and travels north at 30 mph. Another car leaves the same point at the same time and travels west at 40 mph. At what rate is the distance between the two cars changing at that instant when the cars have traveled for 2 hours?. (8 pts)