

Math 14L, Fall 1998, Exam 1

14

PRINT Your Name: _____ Section: _____

There are 10 problems on 5 pages. Each problem is worth 10 points. SHOW your work. **CIRCLE** your answer. NO CALCULATORS! CHECK your answer whenever possible.

1. If $y = x^2 \ln x^2 + (\ln x)^3$, then find $\frac{dy}{dx}$.

$$y' = 2x^2 \ln x + (\ln x)^3$$

$$y' = 2x^2 \frac{1}{x} + 4x \ln x + \frac{3(\ln x)^2}{x}$$

2. Let $f(x) = 2x^2 + x - 4$ for $x \leq -\frac{1}{4}$. Find $f^{-1}(x)$.

Let $y = f^{-1}(x)$ so $f(y) = x$ and $y \leq -\frac{1}{4}$

$$f^{-1}(x) = \frac{-1 - \sqrt{8x + 33}}{4}$$

$$x = 2y^2 + y - 4$$

Solve for y

$$0 = 2y^2 + y - 4 - x \quad a = 2$$

$$y = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \quad b = 1$$

$$c = -4 - x$$

$$y = \frac{\pm \sqrt{1 - 8(-4 - x)}}{4}$$

$$y \leq -\frac{1}{4} \text{ so}$$

$$\frac{-1 - \sqrt{8x + 33}}{4}$$