

NO AIDS are permitted for this quiz. Show all your work. Correct answers with little or no supporting work will not be given credit. Write legibly. Circle your final answer to each problem.

1. (3 pts) Find the inverse function and graph both f and f^{-1} on the same set of axes.

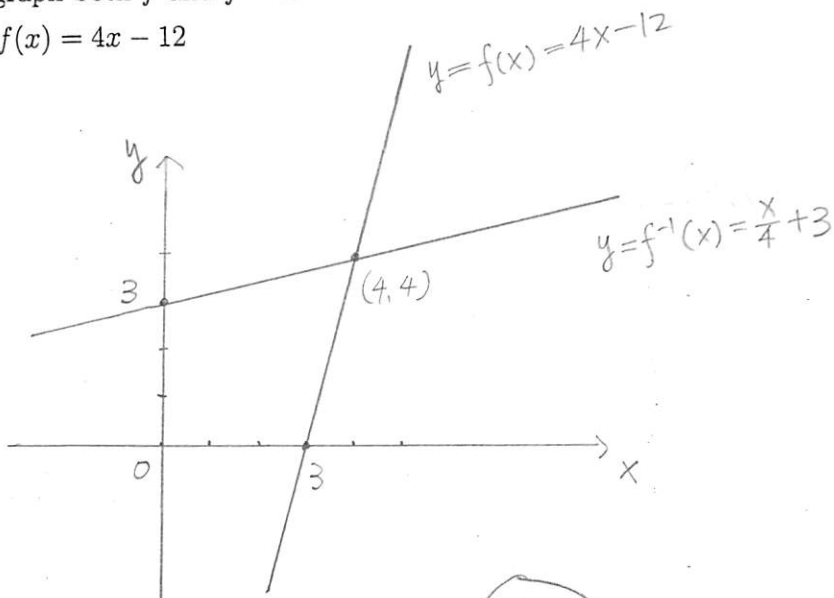
$$f(x) = 4x - 12$$

$$y = 4x - 12$$

$$x = \frac{y + 12}{4}$$

$$y = \frac{x + 12}{4}$$

$$f^{-1}(x) = \frac{x}{4} + 3$$



(+1)

(+2)

2. (3 pts) Find $(f^{-1})'(3)$ if $f(x) = x^3 + x + 1$.

(+1)

$$(f^{-1})'(3) = \frac{1}{f'(f^{-1}(3))}$$

(+1)

$$= \frac{1}{f'(1)}$$

$$(f'(x) = 3x^2 + 1)$$

$$= \frac{1}{3 \cdot 1^2 + 1}$$

(+1)

$$= \boxed{\frac{1}{4}}$$

3. (3 pts) Find the derivative. Give the interval on which the result is valid.

$$\frac{d}{dx}(\ln(\ln x))$$

$$= \frac{1}{\ln x} \cdot \frac{1}{x}$$

+1.5

$$\left. \begin{array}{l} \ln x > 0 \\ x > 0 \end{array} \right\} \Rightarrow \left\{ \begin{array}{l} x > 1 \\ x > 0 \end{array} \right. \Rightarrow \boxed{x > 1}$$

+1.5

The result is valid on the interval $(1, \infty)$.

4. (3 pts) Evaluate the integral.

$$\int \tan x \, dx$$

$$= \int \frac{\sin x}{\cos x} \, dx$$

$$u = \cos x$$

$$du = -\sin x \, dx$$

$$= -\int \frac{1}{u} \, du$$

$$= -\ln|u| + C$$

$$= \boxed{-\ln|\cos x| + C}$$

$$(= \ln|(\cos x)^{-1}| + C = \boxed{\ln|\sec x| + C})$$

+1.5

+1

+1.5