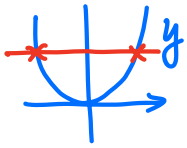
# Quiz9, MAT 1375 Professor Chiu

ID:_____ Name:_____

- This quiz consists of 2 sets of questions, each worth 5 points, for a total of 10 points.
- You have 10 minutes to complete the quiz.
- Scientific calculators are allowed.
- Wishing you success.

True or False questions:

1. T Let $f(x)$ be an invertible function. Then $f(f^{-1}(x)) = x$ and $f^{-1}(f(x)) = x$.
2. F The function $f(x) = x^2$ has an inverse function.
3. T The function $f(x) = x^3$ has an inverse function.
4. F Let $f$ and $g$ be two functions and $f(g(x)) = x$. Then $g = f^{-1}$.
5. T The graph of $f^{-1}$ is the graph of $f$ reflected about the line $y = x$.




has two intersect points with a horizontal line

it needs $g(f(x)) = x$ as well

Show all your work and justify your answer:

6. Use the 4-steps strategy to find the inverse of the function $f(x) = \frac{3x+1}{3x-2}$.

| | |
|---|---|
| **Step 1** | **Replace $f(x)$ with $y$:** |
| **Step 2** | **Interchange $x$ and $y$:** |
| **Step 3** | **Solve for $y$:** |
| **Step 4** | **Replace $y$ with $f^{-1}(x)$:** |

**Step 1** $y = \frac{3x+1}{3x-2}$ $\left(x \neq \frac{2}{3}\right)$

**Step 2** $x = \frac{3y+1}{3y-2}$ $\left(y \neq \frac{2}{3}\right)$

**Step 3**

$\frac{x}{1} \times \frac{3y+1}{3y-2}$

$\Rightarrow x(3y-2) = 3y+1$

$\Rightarrow 3xy - 2x = 3y + 1$

isolate "y" terms

$\Rightarrow 3xy - 3y = 1 + 2x$

$\Rightarrow y(3x-3) = 1+2x$

↑ common factor

$\rightarrow y = \frac{1+2x}{3x-3}$ $(x \neq 1)$

**Step 4** $f^{-1}(x) = \frac{1+2x}{3x-3}$ $(x \neq 1)$