Quiz 3

Math 3C: Precalculus

October 17, 2019

When you finish, please remain seated until class is dismissed

Name: Solutions PID: ____________________

Problem 1 (5 points). Let $f(x) = \sqrt{x-4} + 1$.

(a) Determine a formula for $f^{-1}(x)$.

Let $y = f(x) = \sqrt{x-4} + 1$

Then $y = \sqrt{x-4} + 1$

Solve for x:

$y - 1 = \sqrt{x-4}$

$\Rightarrow (y-1)^2 = x - 4$

$\Rightarrow (y-1)^2 + 4 = x$

Therefore,

$f^{-1}(y) = (y-1)^2 + 4$

(b) What is the range of $f(x)$?

$f(x) = \sqrt{x-4} + 1$ is like $\sqrt{x}$, but shifted right and up. The radical $\sqrt{x-4}$ only outputs numbers ≥ 0, and then I add 1 to the radical. So $\sqrt{x-4} + 1$ is always ≥ 1.

Therefore, range is $\boxed{\text{all } y \geq 1}$

(c) What is the domain of $f^{-1}(x)$?

Domain of $f^{-1}(x)$ is $\boxed{\text{all } y \geq 1}$

(since the domain of $f^{-1}(x)$ is the same as the range of $f(x)$)

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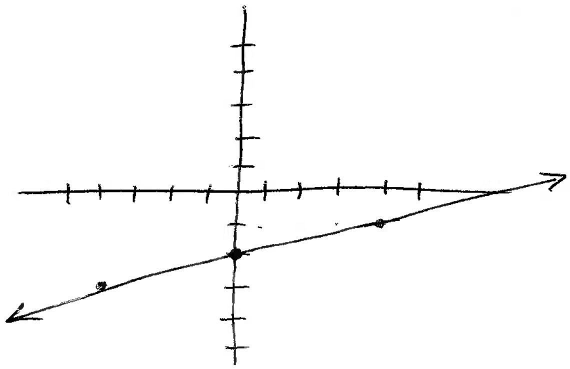
Problem 2 (5 points). (a) Sketch the line $p(d) = \frac{1}{4}d - 2$.



(b) Let $q(d) = \frac{1}{2}d + 3$. Where do the lines $p(d)$ and $q(d)$ intersect? Write your answer as a coordinate pair.

Set $p(d) = q(d)$

So $\frac{1}{4}d - 2 = \frac{1}{2}d + 3$

Solve for d:

$$\frac{1}{4}d = \frac{1}{2}d + 5$$

$$\frac{1}{4}d - \frac{1}{2}d = 5$$

$$\frac{-1}{4}d = 5$$

$$\underline{d = -20}$$

Plug in d: $p(-20) = \frac{1}{2}\cdot(-20) + 3 = -10 + 3 = \underline{\underline{-7}}$

So, intersects at $\boxed{(-20, -7)}$