

Quiz #1

Directions: Carefully read each question below and answer to the best of your ability in the space provided. You **MUST** show your work to receive full credit!

1. (5 points) Let $f(x) = x^2 - 10x + 9$, complete the square, then find the roots of f .

Solution: First, let's complete the square, that is

$$\begin{aligned} f(x) &= x^2 - 10x + 9 \\ &= x^2 - 2 \cdot x \cdot 5 + 25 - 25 + 9 \\ &= \boxed{(x - 5)^2 - 16}. \end{aligned}$$

And now if we want to find the roots of f , we have to set it to 0, that is $f(x) = 0$ and solve for x . It is much easier to use the completed square version of $f(x) = (x - 5)^2 - 16$, when we try to find roots. Because

$$\begin{aligned} f(x) &= (x - 5)^2 - 16 = 0 \\ ((x - 5) - 4)((x - 5) + 4) &= 0 \\ (x - 9)(x - 1) &= 0 \\ x - 9 = 0 \rightsquigarrow x = 9 \quad \text{or} \quad x - 1 = 0 \rightsquigarrow x = 1. \end{aligned}$$

Thus, the roots are $\boxed{x = 1}$ and $\boxed{x = 9}$.

2. (5 points) Find the inverse functions, $f^{-1}(x)$, of $f(x) = 2x^{1/3} - 5$.

Solution: To find the inverse function of $f(x)$, we are going to let $y = f(x)$, therefore, $f(x) = y = 2x^{1/3} - 5$, then swap x and y variables, and solve again for y . That's

$$y = 2x^{1/3} - 5$$

now swap x and y

$$\begin{aligned} x &= 2y^{1/3} - 5 \\ \frac{x + 5}{2} &= y^{1/3} \\ \left(\frac{x + 5}{2}\right)^3 &= y. \end{aligned}$$

Thus

$$f^{-1}(x) = \left(\frac{x + 5}{2}\right)^3 = \frac{(x + 5)^3}{8}.$$

Name: _____

Section (circle one): 003 004

Question:	1	2	Total
Points:	5	5	10
Score:			