

Quiz #2

Math 130, Section 21, David Beydler

Directions: Show all work to get full credit. No calculators, books, notes. Please box your answers. Good luck!

(15 points total)

1. (3 points) Solve $\sqrt{4x+5} - 6 = 2x - 11$.

$$\begin{aligned}\sqrt{4x+5} &= 2x - 5 \\ 4x+5 &= (2x-5)^2 \\ 4x+5 &= 4x^2 - 20x + 25\end{aligned}$$

$$4x^2 - 24x + 20 = 0$$

$$x^2 - 6x + 5 = 0$$

$$(x-5)(x-1) = 0$$

$$\begin{array}{cc} \downarrow & \downarrow \\ x=5 & \text{or } x=1 \end{array}$$

Check:

$$\begin{aligned}x=5: \sqrt{4 \cdot 5 + 5} - 6 &\stackrel{?}{=} 2(5) - 11 \\ \sqrt{25} - 6 &\stackrel{?}{=} 10 - 11 \\ 5 - 6 &\stackrel{?}{=} -1 \\ -1 &= -1 \checkmark\end{aligned}$$

$$\begin{aligned}x=1: \sqrt{4 \cdot 1 + 5} - 6 &\stackrel{?}{=} 2(1) - 11 \\ \sqrt{9} - 6 &\stackrel{?}{=} 2 - 11\end{aligned}$$

$$\begin{array}{l} 3 - 6 \stackrel{?}{=} -9 \\ -3 \neq -9 \end{array}$$

~~5~~ {5}

2. (3 points) Solve $\frac{-x}{x+1} - \frac{1}{x-1} = \frac{-2}{x^2-1}$. (A)

$$\frac{-x}{x+1} - \frac{1}{x-1} = \frac{-2}{(x+1)(x-1)}$$

$$-x(x-1) - (x+1) = -2$$

$$-x^2 + x - x - 1 = -2$$

$$-x^2 - 1 = -2$$

$$-x^2 + 1 = 0$$

~~$$-x^2 = -1$$~~

$$x^2 = 1$$

$x = \pm 1$ ← Neither are solutions to (A)

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3. (3 points) Solve $(2x+5)^{1/3} - (6x-1)^{1/3} = 0$

$$(2x+5)^{1/3} = (6x-1)^{1/3}$$

$$2x+5 = 6x-1$$

$$6 = 4x$$

$$x = \frac{3}{2}$$

$$\left\{ \frac{3}{2} \right\}$$

4. (3 points) Solve $x^{2/3} = 2x^{1/3}$

$$u = x^{1/3}$$

~~3 points~~

$$u^2 = 2u$$

$$u^2 - 2u = 0$$

$$u(u-2) = 0$$

$$u = 0 \quad \text{or} \quad u = 2$$

$$x^{1/3} = 0 \quad \text{or} \quad x^{1/3} = 2$$

$$x = 0 \quad \text{or} \quad x = 8$$

$$\{0, 8\}$$

5. (3 points) Solve $x^4 + 3x^2 - 18 = 0$

$$u = x^2$$

$$u^2 + 3u - 18 = 0$$

$$(u+6)(u-3) = 0$$

$$u = -6 \quad \text{or} \quad u = 3$$

$$x^2 = -6 \quad \text{or} \quad x^2 = 3$$

$$x = \pm\sqrt{-6} \quad \text{or} \quad x = \pm\sqrt{3}$$

$$x = \pm i\sqrt{6}$$

$$\{ \pm i\sqrt{6}, \pm\sqrt{3} \}$$