Test Review

① $\sqrt{9x^2} \cdot x^{4/3} + \sqrt[3]{27x^5}$

$\sqrt{9} \cdot \sqrt{x^2}$

$3 \cdot x^{1=\frac{3}{3}} \cdot 1 \cdot x^{4/3}$

$3x^{7/3} + 3x\sqrt[3]{x^2}$

$3x \cdot x^{2/3}$

$3x^{7/3} + 3x^{\frac{5}{3}}$

$\sqrt[3]{27} \cdot \sqrt[3]{x^5}$

$\sqrt[3]{x^3} \cdot \sqrt[3]{x^2}$

Topics:

1) Exp. Rules
2) Operations of Functions
3) Inverse of Fcn.
4) Radical Eq'ns
5) "Raise to reciprocal" Eq'ns

(2) $f(x) = 4x^{1/2}$ $g(x) = \frac{5}{2}x^{5/2}$

Find $(f \cdot g)(x)$

$= f(x) \cdot g(x)$

$= 4x^{1/2} \cdot \frac{5}{2}x^{5/2} = 10x^{6/2} = 10x^3$

D: $(-\infty, \infty)$

Evaluate: $(f \cdot g)(-2)$

$= 10(-2)^3 = -80$

Q: What if it was $10x^{3/2}$? $\longrightarrow 10 \cdot \sqrt{x}^3$

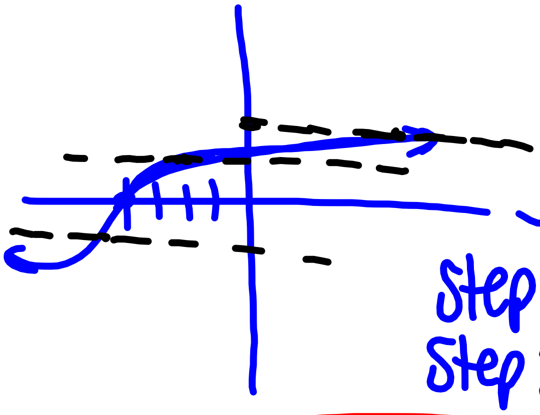
D: $x \geq 0$

OR $[0, \infty)$

can't be negative.

③ Find inverse $\left(f^{-1}(x)\right)$ of $\overset{y}{f(x)} = \sqrt[3]{x+4}$.

Q: Will the inverse be a fcn?



Yes, b/c $f(x) \longrightarrow$ original fcn. passes the HLT.

Step 1: Switch x & y: $x^3 = \left(\cancel{\sqrt[3]{y+4}}\right)^3$

Step 2: Solve for y:

$$x^3 = y + \cancel{4}$$
$$-4 \qquad \cancel{-4}$$
$$x^3 - 4 = y$$

$$\boxed{f^{-1}(x) = x^3 - 4} = g(x)$$

Now, prove using the Round-Trip Thm that they are inverses.

$f(g(x)) = x$

$f(x^3 - 4)$

$= \sqrt[3]{x^3 \cancel{-4} \cancel{+4}}$

$= \sqrt[3]{x^3} = x$ ✓

$g(f(x)) = x$

$g\left(\sqrt[3]{x+4}\right)$

$= \left(\sqrt[3]{x+4}\right)^3 - 4$

$= x + \cancel{4} - \cancel{4}$

$= x$ ✓

④ Solve + Check: $x = \cancel{5} + \sqrt{3x-11}$ · isolate radical

$-5 \quad \cancel{-5}$

$(x-5)^2 = (\sqrt{3x-11})^2$ · sq. both sides

$(x-5)(x-5)$

$x^2 - 10x + 25 = 3x - \cancel{11}$

$-3x + 11 \quad -\cancel{3x} + 11$

$x^2 - 13x + 36 = 0$

$(x-9)(x-4) = 0$

✓ $\boxed{x = 9}$ | $\cancel{x = 4}$ reject

ck: ① $9 \stackrel{?}{=} 5 + \sqrt{3(9)-11}$

$9 = 5 + 4$ ✓

② $4 \stackrel{?}{=} 5 + \sqrt{3(4)-11}$

$4 = 5 + \sqrt{1}$

$4 = 5 + 1$

$\cancel{4 = 6}$

5 Solve: $\left[(n+10)^{\cancel{-2/3}}\right]^{\cancel{-3/2}} = \frac{1}{16}^{-3/2}$

$n+10 = 16^{3/2}$

$n+\cancel{10} = 64$

$-\cancel{10} \quad -10$

$\boxed{n = 54}$