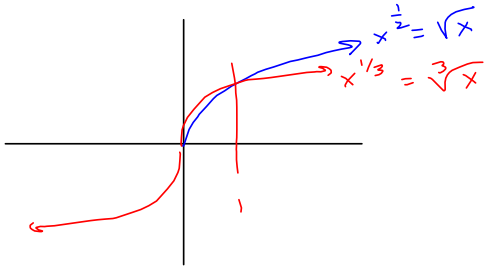
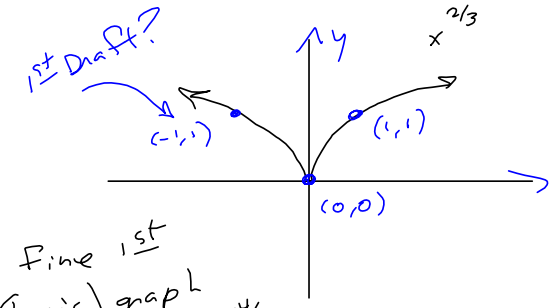
10. Basic Function $x^{2/3}$ & $x^{\text{even/odd}}$ in general



$x^{\frac{1}{5}}, x^{\frac{1}{7}}, x^{\frac{1}{9}} \approx x^{\frac{1}{3}}$ shape

$x^{\frac{1}{4}}, x^{\frac{1}{6}}, x^{\frac{1}{8}} \approx x^{\frac{1}{2}} = \sqrt{x}$

Now $x^{\frac{2}{3}} = x^{(\frac{1}{3})(2)} = \left(x^{\frac{1}{3}}\right)^2$



Fine 1st (basic) graph

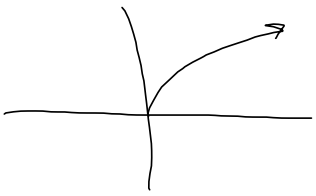
$x^{2/5}, x^{4/5}, x^{2/7}, x^{4/7}$

The Basic Graph.

All $x^{\text{even/odd}}$ look like this, when numerator < denominator

$2 < 3$

for $x^{2/3}$



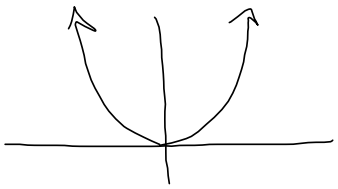
ODD / EVEN

Domain $[0, \infty)$

$1/2, 3/4, 7/8, 5/8, 3/8 < 1$

FOR HIGHER POWERS (RATIONAL)

EVEN / ODD

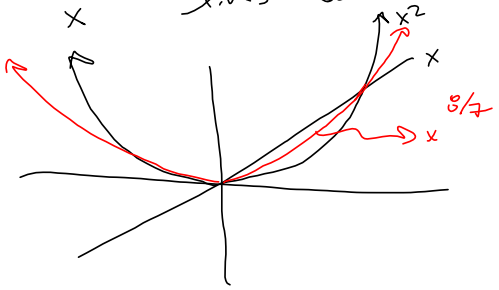


$x^{\frac{8}{7}}, x^{12/5}$

like x^2, x^4, x^6, x^8

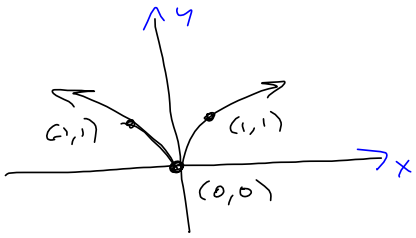
In detail, find the nearest integer power.

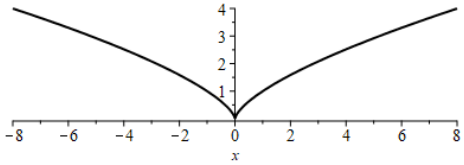
$x^{8/7}$ lines between x^1 & x^2



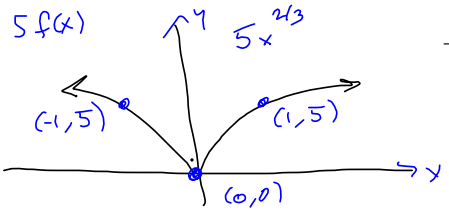
$g(x) = 5(3x+21)^{2/3} - 11$

0. $f(x) = x^{2/3}$

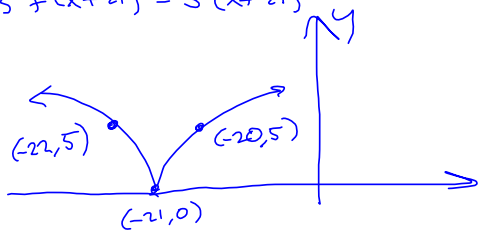




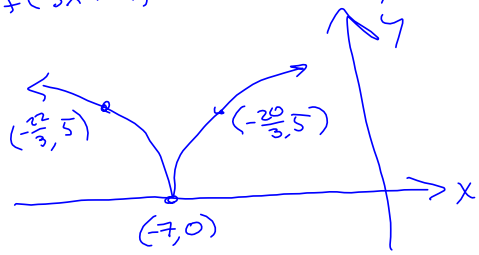
① $5f(x)$ $5x^{2/3}$



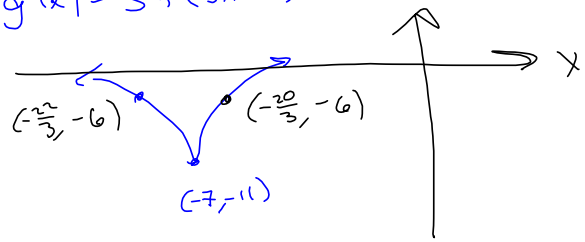
② $5f(x+21) = 5(x+21)^{2/3}$



③ $5f(3x+21) = 5(3x+21)^{2/3}$



④ $g(x) = 5f(3x+21) - 11 = 5(3x+21)^{2/3} - 11$



① $x^{2/3}$ METHOD 1

② $5x^{2/3}$ $y \mapsto 5y$

③ $5(x+21)^{2/3}$ $x \mapsto x-21$

④ $5(3x+21)^{2/3}$ $x \mapsto \frac{1}{3}x$

⑤ $5(3x+21)^{2/3} - 11$ $y \mapsto y - 11$

Better!

THAT WAS METHOD 1

$g(x) = 5(3x+21)^{2/3} - 11 = 5(3(x+7))^{2/3} - 11$ METHOD 2

0 $f(x) = x^{2/3}$

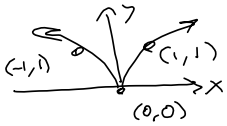
1 $5f(x) = 5x^{2/3}$ $y \longmapsto 5y$

2 $5f(3x) = 5(3x)^{2/3}$ $x \longmapsto \frac{1}{3}x$

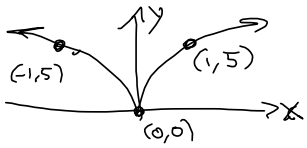
3 $5f(3(x+7))^{2/3}$ $x \longmapsto x-7$

4 $5f(3(x+7)) - 11$ Down 11

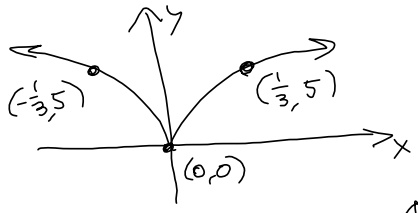
0 $f(x) = x^{2/3}$



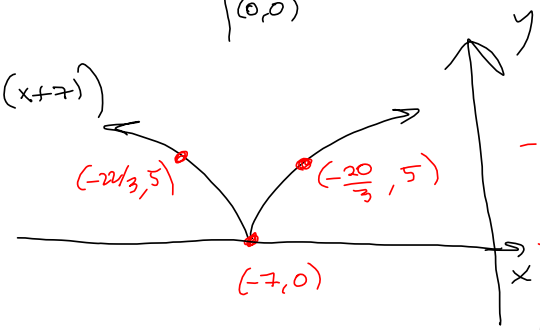
1 $5f(x)$



2 $5f(3x)$



3 $5f(3(x+7))$



$-\frac{1}{3} - \frac{7}{1}\cdot\frac{3}{3} = \frac{-1-21}{3} = -\frac{22}{3}$

$+\frac{1}{3} - 7 = -\frac{20}{3}$

KNOW YOUR ARITHMETIC.

4 See Previous Page.