1. Use the Laws of Exponents to rewrite and simplify. Write down the rules that you are using to the ~~side of your work~~. (below in red)

a. $\sqrt[3]{x^{-2}}$

$\sqrt[3]{x^{-2}} = x^{-2/3}$

$a^{1/n} = \sqrt[n]{a}$

and $(a^m)^n = a^{mn}$

b. $b^{(n-1)}(3b^2)^n$

$= b^{n-1} 3^n b^{2n}$

$(a^m)^n = a^{mn}$

$(ab)^n = a^n b^n$

$= b^{n-1+2n} \cdot 3^n$

$a^m a^n = a^{m+n}$

$= (b^{3n-1}) 3^n$

c. $\frac{6x^2y}{\sqrt{4xy^3}}$

$= \frac{6x^2y}{2x^{1/2}y^{3/2}}$

$a^{1/n} = \sqrt[n]{a}$

$(ab)^m = a^m b^m$

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

$a^{-1} = \frac{1}{a}$

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

$a^m a^n = a^{m+n}$

2. Are the following statements true or false? If either case, explain why. ~~If possible, change the false statements so that they are a true statement.~~ Provide a counterexample to the false statement.

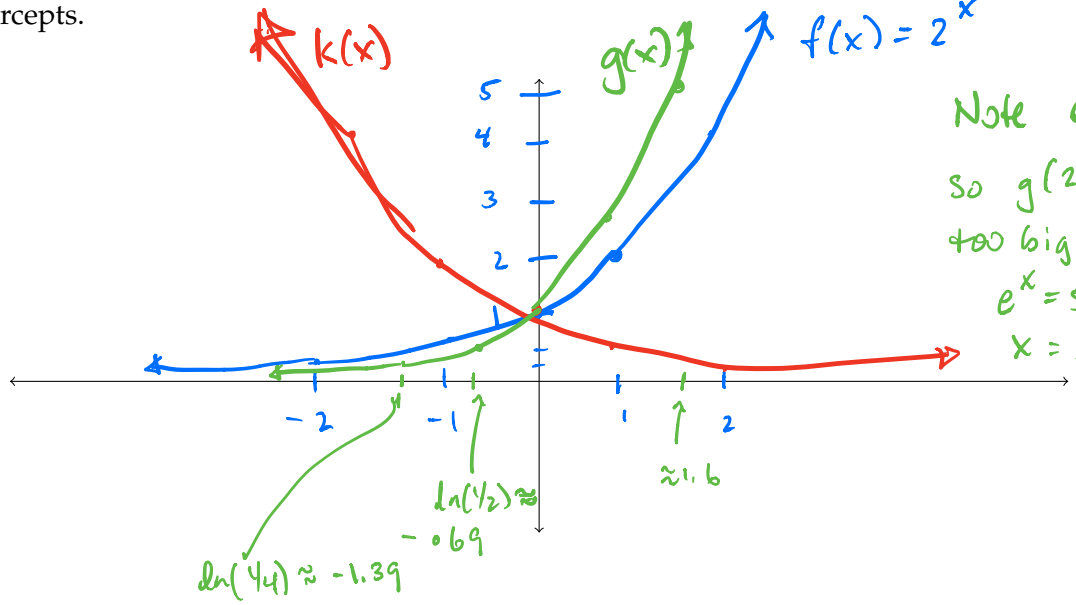
a. $(a+b)^2 = a^2 + b^2$ False! $1^2 + 2^2 = 5$ but $(1+2)^2 = 9$.

b. $\sqrt{x^2+4} = x+2$ False! $\sqrt{1^2+4} = \sqrt{5}$ but $1+2=3$

c. $\frac{a+b}{c+d} = \frac{a}{c} + \frac{b}{d}$ False! $\frac{1+2}{3+4} = \frac{3}{7}$ but $\frac{1}{3} + \frac{2}{4} = \frac{4}{12} + \frac{6}{12} = \frac{10}{12} = \frac{5}{6}$

d. $\frac{a+b}{c} = \frac{a}{c} + \frac{b}{c}$ True!

3. On the axes below, graph $f(x) = 2^x$, $g(x) = e^x$, and $k(x) = \left(\frac{1}{2}\right)^x$. Label any x- and y-intercepts.



Note $e \approx 2.718$

so $g(2) \approx 7.38$ too big.

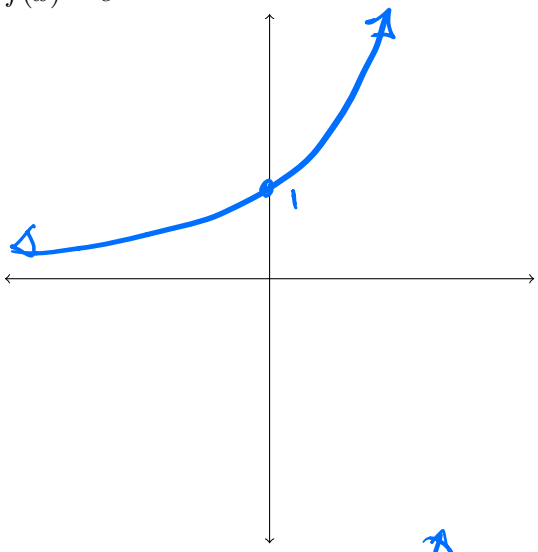
$e^x = 5 \Rightarrow x = \ln(5) \approx 1.6$

4. What is the domain and range of $f(x) = 2^x$? Asymptotes?

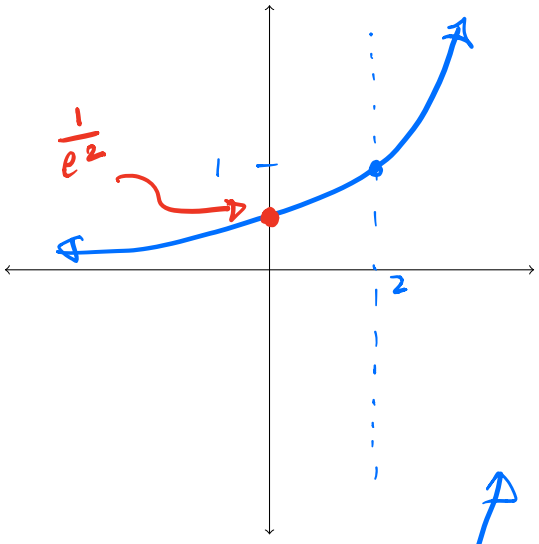
Domain: all real #s $(-\infty, \infty)$
Range: all positive reals $(0, \infty)$
HA at $y = 0$ (as $x \to -\infty$); no VA

5. Sketch the graph of each function below, using what you know about transformations of functions. Determine its domain and range, and label any x- and y-intercepts (use exact numbers) and horizontal or vertical asymptotes.

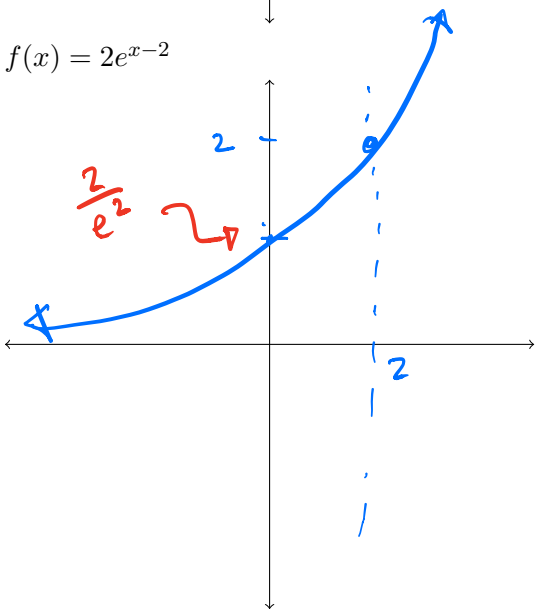
(a) $f(x) = e^x$



(c) $f(x) = e^{x-2}$ = exp(x-2) shift → by 2



(b) $f(x) = 2e^{x-2}$



(d) $f(x) = 1 + 2e^{x-2}$