PRECALCULUS CONCEPTUALLY **NAME**_____

1. Give the domains and ranges of the following functions.

Function	Domain	Range
$f(x)=x^2$		
$f(x)=\frac{1}{x^2}$		
$f(x)=\sqrt{x}$		
$f(x)=\frac{1}{\sqrt{x}}$		
$f(x)=x^3$		
$f(x)=\frac{1}{x^3}$		
$f(x)=\ln x$		
$f(x)=\lvert\ln x\rvert$		
$f(x)=\ln\lvert x\rvert$		
$f(x)=e^x$		
$f(x)=e^{-x}$		
$f(x)=e^{\lvert x\rvert}$		

2. Complete the following chart about exponential functions of the form $f(x)=ab^x$ for $a>0$ and either $0<b<1$ or $b>1$.

Characteristic	$0<b<1$	$b>1$
Domain		
Range		
y-intercept		
Horizontal asymptote		
Vertical asymptote		
Increasing/decreasing		
Concavity		

3. If $f(x)=\sqrt{x^2+1}$ and $g(x)=e^{x^2}$, then $f(g(x))=$_____ and $g(f(x))=$_____.

4. Use properties of logarithms to rank from smallest to largest the following numbers:

$\ln 30-\ln 2$, $2\ln 4$, $\ln 3+\ln 4$, $\frac{\ln 4}{\ln 2}$ _____

5. a. If $\log(x-a)=n$, then $x=$_____.

b. If $\ln(x-a)=n$, then $x=$_____.

6. Complete the following chart about exponential and logarithmic functions.

Function	Increasing/decreasing	Concavity
$f(x)=e^{x}$		
$f(x)=e^{-x}$		
$f(x)=-e^{x}$		
$f(x)=e^{x-4}$		
$f(x)=e^{4-x}$		
$f(x)=\ln x$		
$f(x)=\ln(-x)$		
$f(x)=-\ln x$		
$f(x)=\ln(x-4)$		
$f(x)=\ln(4-x)$		

7. Find the inverse of the following functions.

a. $P=16e^{14t}$ _____

b. $P=16\ln(14t)$ _____

8. Complete the following chart about trigonometric and inverse trigonometric functions.
(* denotes principal values)

Functions	Domain	Range
$f(x)=\sin x$		
$f(x)=\cos x$		
$f(x)=\tan x$		
* $f(x)=\arcsin x$		
* $f(x)=\arccos x$		
* $f(x)=\arctan x$		

9. a. If $y=\arcsin x$, then $\cos y=$_____.

b. If $y=\arcsin x$, then $\tan y=$_____.

c. If $y=\arctan x$, then $\cos y=$_____.

d. If $y=\arctan x$, then $\sin y=$_____.

10. Rank the following functions from smallest to largest as $x\to\infty$:

$f(x)=5x$, $g(x)=x^{5}$, $h(x)=5^{x}$, $k(x)=0.5^{x}$, $l(x)=5^{-x}$

_____

11. If $f(x)=\dfrac{x^{2}-1}{x+1}$ and $g(x)=x-1$, does $f(x)=g(x)$? _____ Why or why not? _____

12. Complete the following charts and answer the questions about power and algebraic functions.

Characteristic	$f(x)=x^2$	$f(x)=x^3$	$f(x)=x^4$	$f(x)=x^5$
General shape				
Domain				
Range				
Increasing when				
Decreasing when				
Concave up when				
Concave down when				

Common intersection(s) of all of these functions are _____.

For $x>1$, rank the functions from smallest to largest: _____

For $0<x<1$, rank the functions from smallest to largest: _____

Characteristic	$f(x)=x^{-1}$	$f(x)=x^{-2}$	$f(x)=x^{-3}$	$f(x)=x^{-4}$
General shape				
Domain				
Range				
Increasing when				
Decreasing when				
Concave up when				
Concave down when				

Common intersection(s) of all of these functions are _____.

For $x>1$, rank the functions from smallest to largest: _____

For $0<x<1$, rank the functions from smallest to largest: _____

Characteristic	$f(x)=x^{\frac{1}{2}}$	$f(x)=x^{\frac{1}{3}}$	$f(x)=x^{\frac{1}{4}}$	$f(x)=x^{\frac{1}{5}}$
General shape				
Domain				
Range				
Increasing when				
Decreasing when				
Concave up when				
Concave down when				

Common intersection(s) of all of these functions are _____.

For $x>1$, rank the functions from smallest to largest: _____

For $0<x<1$, rank the functions from smallest to largest: _____