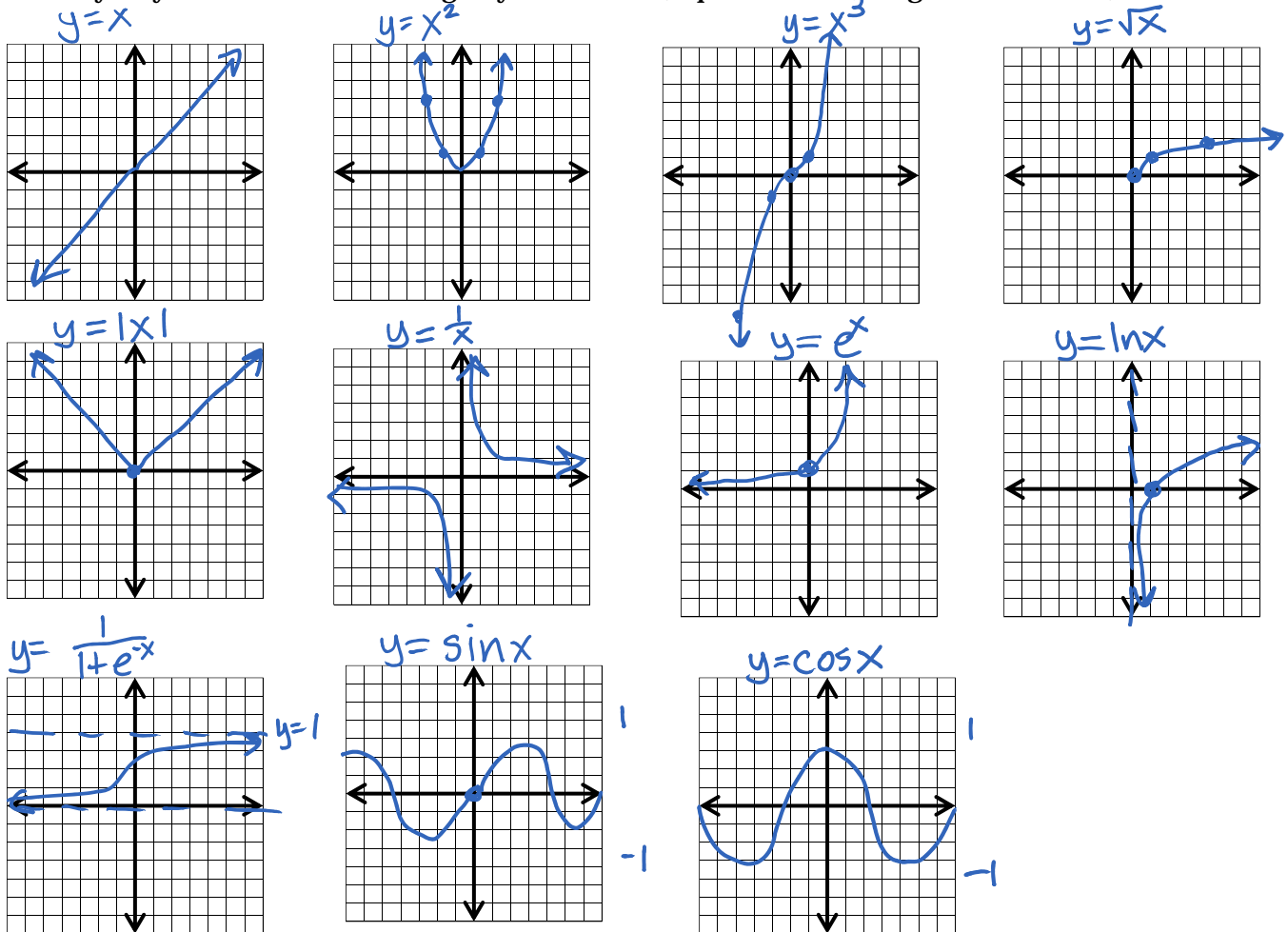Name __Key__

NO CALC!

1. Write the equations of the eleven basic functions and graph each one. Try to remember as many as you can before looking at your notes! (Equations will be given on exam.)

$y=x$

$y=x^2$

$y=x^3$

$y=\sqrt{x}$

$y=|x|$

$y=\frac{1}{x}$

$y=e^x$

$y=\ln x$

$y=\frac{1}{1+e^{-x}}$ $y=1$

$y=\sin x$ 1 -1

$y=\cos x$ 1 -1

2. Answer the following questions about the basic functions.

   a) List the functions that have a range of all real numbers.

   $y=x$, $y=x^3$, $y=\ln x$

   b) List the functions that are odd.

   $y=x$, $y=x^3$, $y=\frac{1}{x}$, $y=\sin x$

   c) List the functions that are increasing over the entire domain.

   $y=x$, $y=x^3$, $y=\sqrt{x}$, $y=\ln x$, $y=e^x$, $y=\frac{1}{1+e^{-x}}$

   d) List the functions that have at least one horizontal asymptote.

   $y=\frac{1}{x}$, $y=e^x$, $y=\frac{1}{1+e^{-x}}$

3) Determine if each function is odd, even, or neither. Show all work to support your answer.

a) $f(x) = -\dfrac{2 - x^4}{x^2}$

$f(-x) = -\dfrac{2-(-x)^4}{(-x)^2} = \dfrac{-2-x^4}{x^2}$ same- EVEN

b) $f(x) = x^3 - 5x^2 + 3$

$f(-x) = (-x)^3 - 5(-x)^2 + 3$
$= -x^3 - 5x^2 + 3$
opp same same NEITHER

4) Given: $f(x) = \sqrt{3-x}$, find $f^{-1}(x)$ and the domain and range of the inverse.

DOM: $3-x \geq 0$
$3 \geq x$
$(-\infty, 3]$
RANGE: $[0, \infty)$

$y = \sqrt{3-x}$
$x = \sqrt{3-y}$
$x^2 = 3-y$

$\boxed{y = 3 - x^2}$
inverse

$\boxed{\text{Dom: } [0, \infty) \quad \text{Range: } (-\infty, 3]}$

5) Given: $f(x) = \dfrac{1}{x^2}$ and $g(x) = \sqrt{5+x}$, find $f(g(x))$ and state its domain.

$f(g(x)) = \dfrac{1}{(\sqrt{5+x})^2} = \boxed{\dfrac{1}{5+x}}$

Dom: $5+x > 0$
$x > -5$
$\boxed{(-5, \infty)}$

CALC OK!

6) Given the function $h(x) = -2x^4 + x^3 + 5x^2 + 1$, answer the following questions and sketch the graph.

a) Vertical Asymptote _____

b) Horizontal Asymptote _____

c) Domain $\mathbb{R}$

d) Range $(-\infty, 5.940]$

e) Increasing Intervals $(-\infty, -.946)$ $\cup (0, 1.321)$

f) Decreasing Intervals $(-.946, 0) \cup (1.321, \infty)$

g) Constant Intervals _none_

h) Continuous? (YES)/NO

i) Local Max 3.026 @ $x = -.946$

j) Local Min 1 @ $x = 0$

k) Abs. Max 5.940 @ $x = 1.321$

l) Abs. Min _none_

m) Bounded/(Bounded Above)/Bounded Below/Unbounded

n) Lower Bound _none_

o) Upper Bound 5.940

p) Odd/ Even/(Neither)