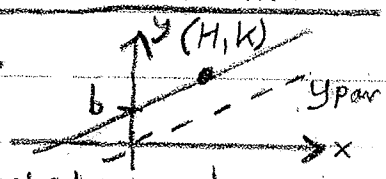
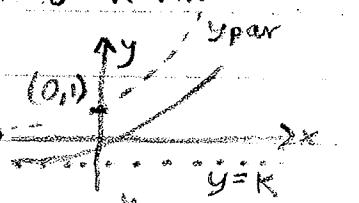
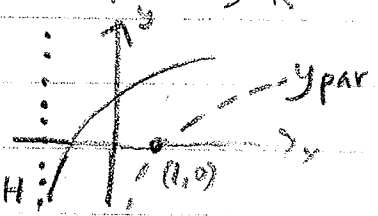
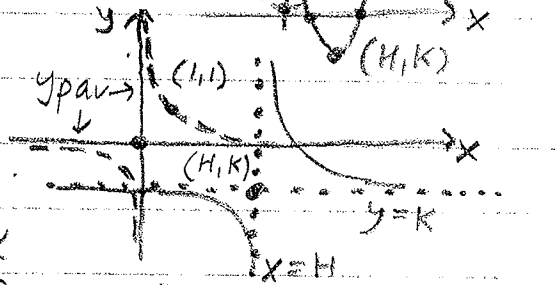
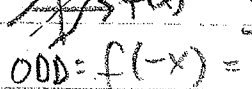
# Functions: One-page Summary

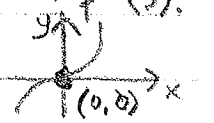
SHEET N150 8/29/07 9/28/07 V.2 8/22/08 V.3

$H, K$ = HORIZ. + VERT. SHIFTS. $A$ = VERT. STRETCH. $B$ = HORIZ. SHRINK

| | PARENT ($y_{par}$) | CHILD FUNCTIONS |
|---|---|---|
| LINE | $y = mx$ | $y - k = m(x - H)$   point $= (H,K)$. slope $= m$. y-intercept $= b = k - mh$ |
| EXP. ONENTIAL | $y = e^x$ | $y - k = Ae^{Bx}$   Horizontal asymptote $y = K$. Continuous rate constant $= B$. |
| LOG-ARITHM | $y = \ln(x)$ | $y - k = \ln(x - H)$   Vertical asymptote $x = H$. |
| QUAD-RATIC | $y = x^2$ | $y - k = A(x - H)^2$   Vertex: $(H,K)$. $A$ = Vertical Stretch. |
| RECI-PROCAL | $y = \frac{1}{x}$ | $y - k = \frac{A}{x - H}$   Vert. asy: $x = H$ Horiz asy: $y = K$ |
| SINE | $y = \sin(x)$ | $y - k = A\sin[B(x - H)]$ $\lvert A \rvert$ = Amplitude. $B = \frac{2\pi}{T}$. $T$ = period = Horiz Stretch. |

FUNCTION. $X$ (DOMAIN) $\to y = f(x)$ (RANGE), $y$ UNIQUE. ZEROS: $x$ when $f(x) = 0$.

INVERTIBLE (1 FT-TO-1). $f(g(x)) = g(f(x)) = x$   $y = f(x) \leftrightarrow x = f^{-1}(y)$.

SYMMETRY. EVEN: $f(-x) = f(x)$   ODD: $f(-x) = -f(x)$  

REFLECT ABOUT X-AXIS: $y = f(x)$ PARENT to $y = -f(x)$ CHILD  

EXP-LOG. $e^u \cdot e^v = e^{u+v}$. $(e^u)^v = e^{u \cdot v}$. $\ln(u \cdot v) = \ln(u) + \ln(v)$. $\ln(u^v) = v \cdot \ln(u)$.

CONTINUOUS GROWTH $y = Ae^{|B|t}$ DECAY $y = Ae^{-|B|t}$ ($B$ = Contin. rate constant)

$y = A \cdot (S)^t$ ($S$ = base). $y = A\left(\frac{1}{2}\right)^{t/T}$. $y = A(2)^{t/T}$ ($T$ = half life or doubling time)

COMPOUNDED (SEQUENCE / PIECEWISE FUNCTION WITH JUMPS): $y = A\left(1 + \frac{r}{100}\right)^t$. $r$ = annual interest rate (%)

TRIG. CARTESIAN: $x = r\cos\theta$, $y = r\sin\theta$. POLAR: $r = \sqrt{x^2 + y^2}$, $\theta = \tan^{-1}\left(\frac{y}{x}\right)$.