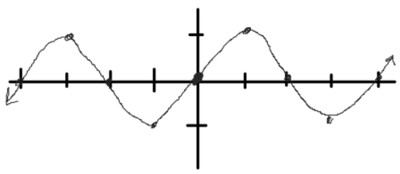
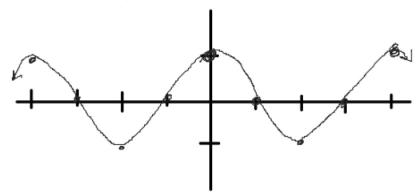
# Trig Graphs

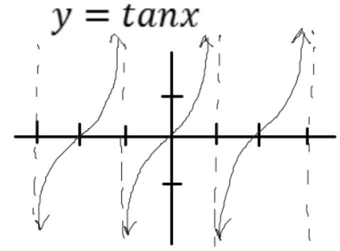
$y = sinx$



$y = cosx$



$y = tanx$



## Identify parts of the equation

$y = 2\sin(3x + \pi) + 4$

$2\sin 3\left(x + \frac{\pi}{3}\right) + 4$

amplitude: 2

period: $\frac{2\pi}{3}$

phase shift (H.S.): Left $\frac{\pi}{3}$

vertical shift: up 4

$y = -3\cos(5x - 4)$

$-3\cos 5\left(x - \frac{4}{5}\right)$

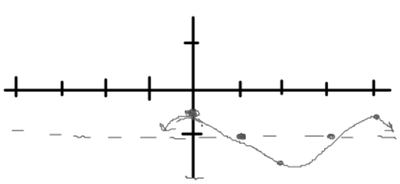
amplitude: 3 (reflection)

period: $\frac{2\pi}{5}$

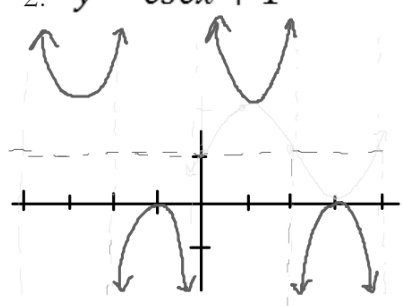
phase shift (H.S.): right $\frac{4}{5}$

vertical shift: none or 0

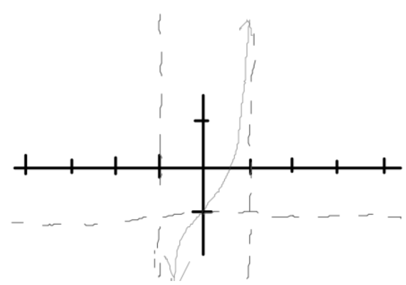
1. $y = \frac{1}{2}cos\theta - 1$



2. $y = cscx + 1$



3. $y = 2tanx - 1$



# Rational Functions

End Behavior Asymptotes = Horizontal Asymptote

case 1: Highest Exponent in the denominator

$$y = \frac{1}{x} \quad , \qquad y = \frac{3x+4}{x^2-2}$$

E.B.A. $y=0$ $\qquad$ $y=0$

case 2: Highest exponent in denominator and numerator

$$y = \frac{3x+2}{x-1} \quad , \qquad y = \frac{x^4-3x}{-4x^4}$$

Ratio of leading coeff.

E.B.A. $y=3$ $\qquad$ $y=-\frac{1}{4}$

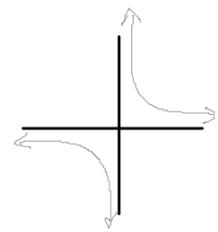
case 3: Highest exponent in numerator

$$y = \frac{5x^3+2x}{x^2-1}$$

Divide the denominator into the numerator

E.B.A. $y=5x$

$$f(x) = \frac{1}{x}$$



D: $(-\infty,0)(0,\infty)$

R: $(-\infty,0)(0,\infty)$

1. $f(x) = \dfrac{x+3}{x-4}$

VA: $x=4$

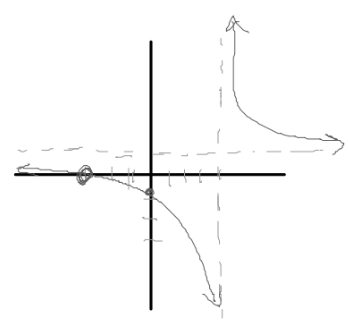
EBA (HA): $y=1$

x-int: $(-3,0)$

y-int: $\left(0,-\frac{3}{4}\right)$

D: $(-\infty,4)(4,\infty)$

R: $(-\infty,1)(1,\infty)$



**2.** $f(x)=\frac{-3}{x^2}$

**VA:** $x=0$

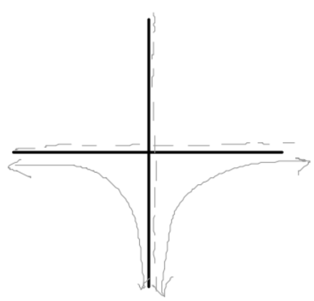
**EBA (HA):** $y=0$

**x-int:** none

**y-int:** none

**D:** $(-\infty,0)(0,\infty)$

**R:** $(-\infty,0)$



**3.** $f(x)=\frac{x-5}{x^2-2x-8}=\frac{x-5}{(x-4)(x+2)}$

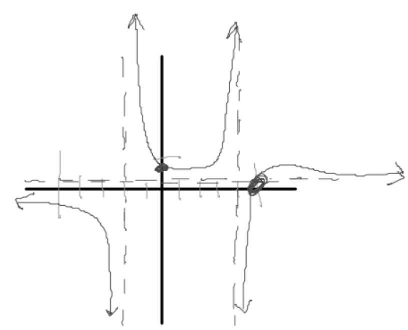
**VA:** $x=4,-2$

**EBA (HA):** $y=0$

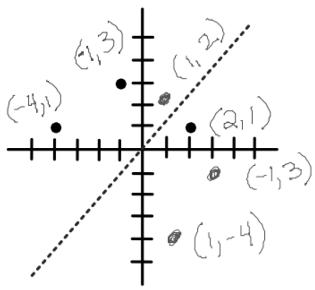
**x-int:** $(5,0)$

**y-int:** $(0,\frac{5}{8})$

**D:** $(-\infty,-2)(-2,4)(4,\infty)$



# Inverse Functions
## Section 1.5




reflects over
$y = x$

**Find the inverse of f(x).**

**1.** $f(x) = 3x - 1$

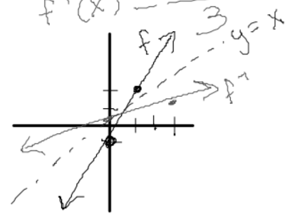
$y = 3x - 1$

$f^{-1}$ $x = 3y - 1$

$x + 1 = 3y$

$\frac{x+1}{3} = y$

$f^{-1}(x) = \frac{x+1}{3}$




**2.** $f(x) = x^3 + 6$

$y = x^3 + 6$

$f^{-1}$ $x = y^3 + 6$

$x - 6 = y^3$

$\sqrt[3]{x-6} = y$

$f^{-1}(x) = \sqrt[3]{x-6}$


**Property of Inverse Functions:**

$f^{-1}(f(x)) = x$ $\qquad$ $f(f^{-1}(x)) = x$

**3. Show that $f(x)$ and $g(x)$ are inverse functions algebraically.**

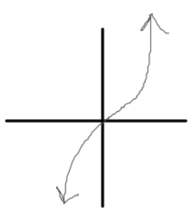
$f(x) = 3 - 4x \qquad g(x) = \dfrac{3-x}{4}$

$$f(g(x)) = 3 - 4\left(\frac{3-x}{4}\right) = 3 - (3-x) = x$$

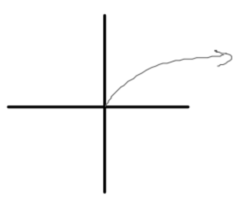
and

$$g(f(x)) = \frac{3-(3-4x)}{4} = \frac{3-3+4x}{4} = x$$

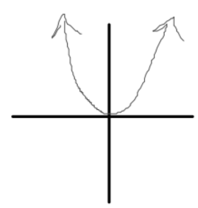
**<u>Inverse Functions must be "one-to-one" functions.</u>** One-to-One functions must pass both the Vertical and Horizontal line tests



yes - one to one fnct.



yes, one to one function



no, not one to one

**4. Find the inverse of $f(x) = x^2 + 2$ for $x \le 0$.**

Why is there a condition?

$y = x^2 + 2$

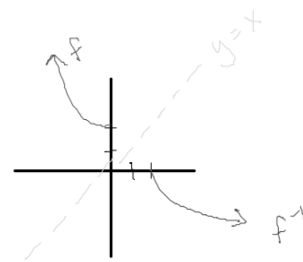
$f^{-1}$: $x = y^2 + 2$

$\sqrt{x-2} = y$

$f^{-1}(x) = -\sqrt{x-2}$

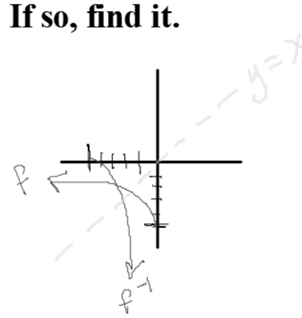
negative to fit condition

| $f(x)$ | $f^{-1}(x)$ |
|---|---|
| D: $(-\infty, 0]$ | D: $[2, \infty)$ |
| R: $[2, \infty)$ | R: $(-\infty 0]$ |



5. **Determine if the function has an inverse. If so, find it.**

$f(x)=\sqrt{-x}-5$ ← Domain $(-\infty,0]$




$y=\sqrt{-x}-5$

$f^{-1}$

$x=\sqrt{-y}-5$

$x+5=\sqrt{-y}$

$(x+5)^2=-y$

$-(x+5)^2=y$

$f^{-1}(x)=-(x+5)^2$

| $f(x)$ | $f^{-1}(x)$ |
|---|---|
| D: $(-\infty,0]$ | D: $[-5,\infty)$ |
| R: $[-5,\infty)$ | R: $(-\infty,0]$ |