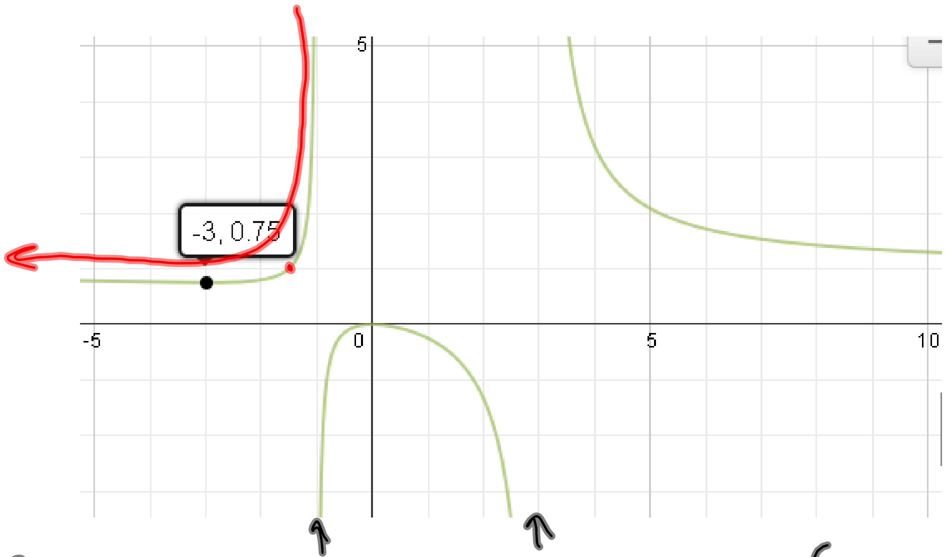
1)



$x^2 - 2x - 3 = (x-3)(x+1)$

$x \neq 3 \quad x \neq -1$

D: $\{x : x \neq 3, x \neq -1\}$

R: $\{y : y \leq 0, y \geq .75\}$

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

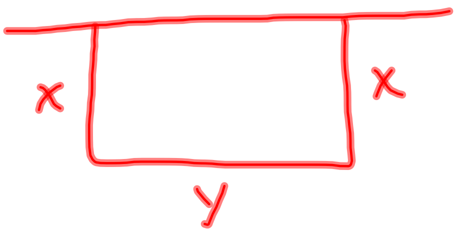
$$x^2 - 2x - 3 = x^2$$

$$-2x - 3 = 0$$

$$-2x = 3$$

$$x = -\frac{3}{2}$$

2)



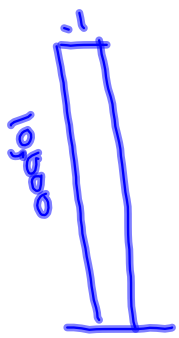
$L = 2x + y$

$x \cdot y = 1000 = A$

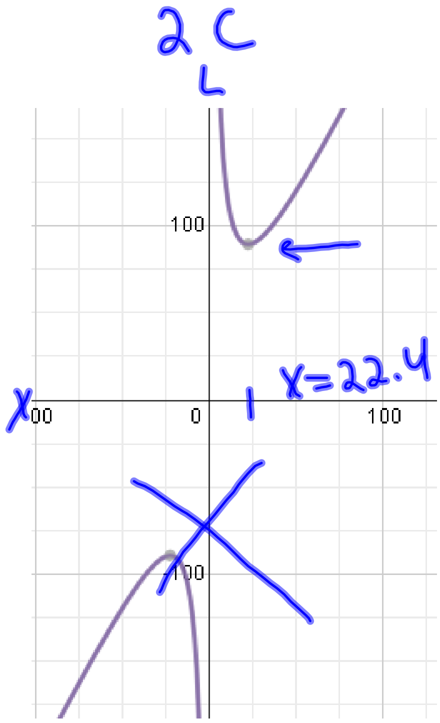
$L = 2x + \frac{1000}{x}$

$y = \frac{1000}{x}$

2b) $x > 0$



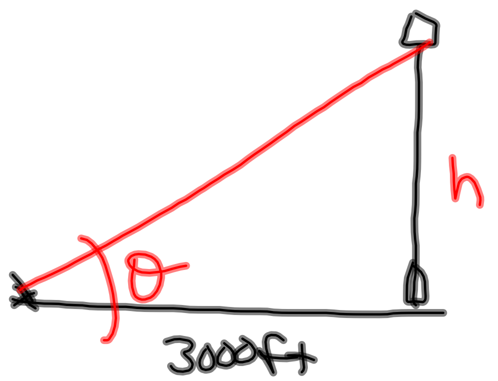
2c



2c) $L = 2x + \frac{1000}{x}$

2d) $L = 89.4$

3)

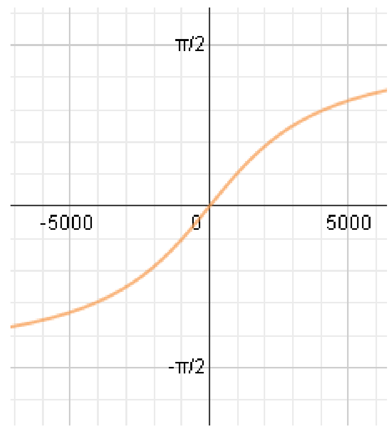


$\tan\theta = \frac{h}{3000}$

$\tan^{-1}\left(\frac{h}{3000}\right) = \theta$

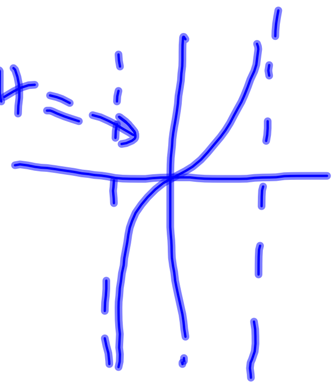
D: $\{x : x \in \mathbb{R}\}$

R: $\{-\frac{\pi}{2} < \theta < \frac{\pi}{2}\}$



$Y = \tan^{-1}(x)$

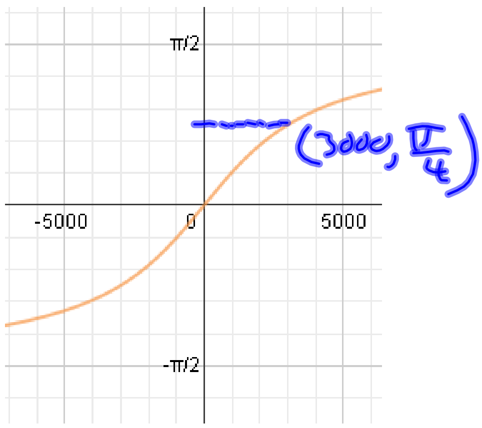
$\tan x =$

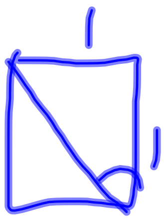


3c) $h \geq 0$

$0 \leq \theta < \frac{\pi}{2}$

3d) $\underline{\underline{3000 ft}}$





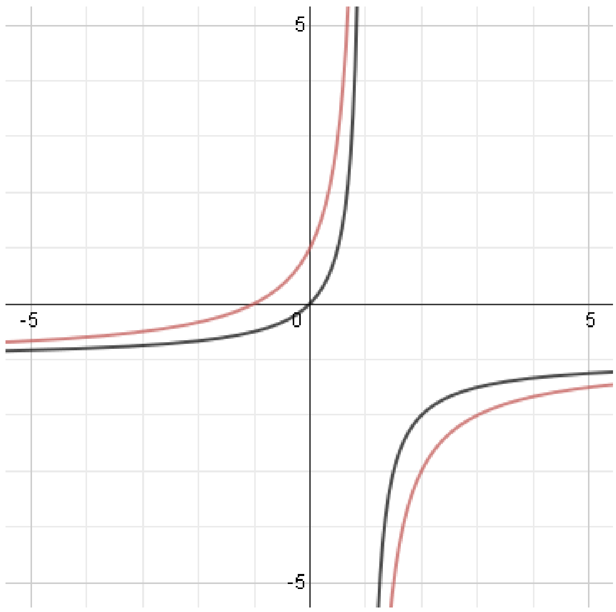
4) $(f\circ g)(\sqrt{6}) = f(g(\sqrt{6})) = f\left(\sqrt{\sqrt{6}^2+3}\right)$

$= f(\sqrt{9}) = f(3) = \sqrt{3-3} = 0$

$(g\circ f)(3) = g(f(3)) = g(\sqrt{3-3}) = g(0)$

$= \sqrt{0^2+3} = \sqrt{3}$

5)



Range for g(x) does not include y = -1

So the cmp (f∘g)(x)

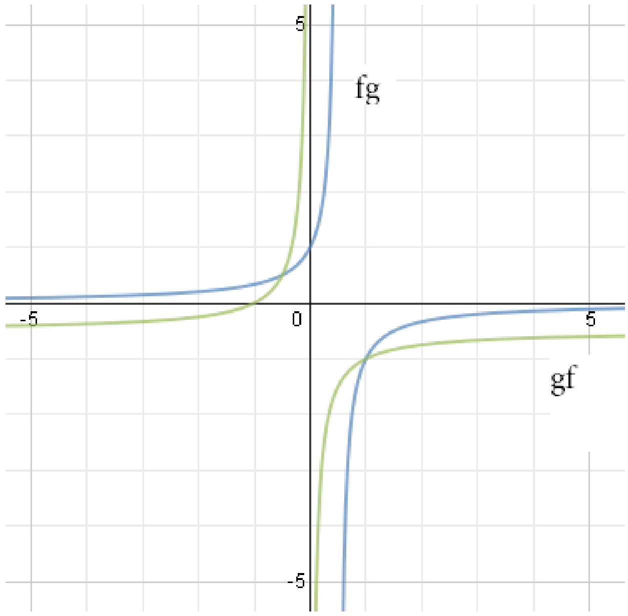
$(f\circ g)(x) = f\left(\frac{x}{1-x}\right)$

$= \dfrac{1+\frac{x}{1-x}}{1-\frac{x}{1-x}}\left(\dfrac{1-x}{1-x}\right)$

$= \dfrac{1-x+x}{1-x-x} = \dfrac{1}{1-2x}$

D: $\{x : x \neq \tfrac{1}{2}, x = 1\}$

R: $\{y : y \neq 0, y = -1\}$



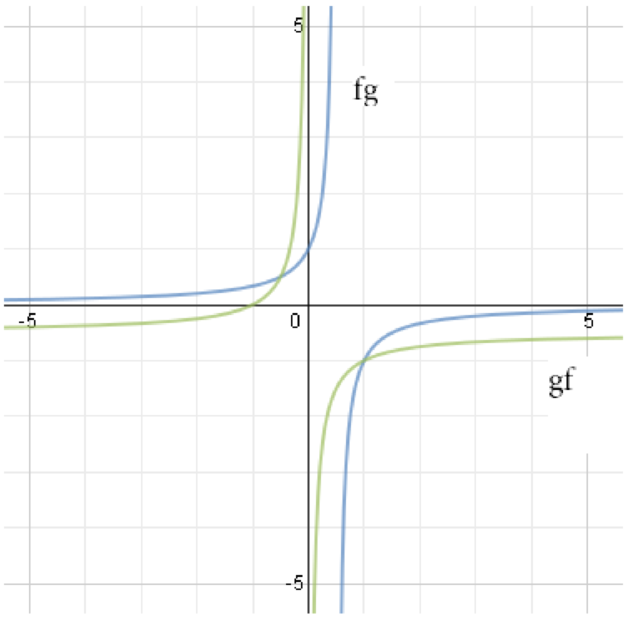
$$(g \circ f)(x) = g\left(\frac{1+x}{1-x}\right)$$

$$= \frac{\frac{1+x}{1-x}}{1 - \frac{1+x}{1-x}} \left(\frac{1-x}{1-x}\right)$$

$$= \frac{1+x}{1-x-(1+x)} = \frac{1+x}{-2x}$$

$D: \{x : x \neq -1, x \neq 0\}$

$R: \{y : y \neq -1, y \neq -\frac{1}{2}\}$



6)
$$\lim_{x\to 0^+} f(x) = \lim_{x\to 0^+} 2(x) = 0^+$$

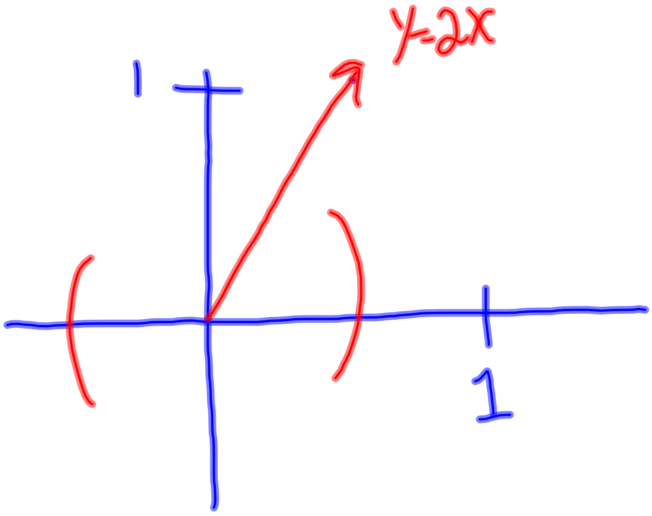
$$\lim_{x\to 1} f(x) = ?$$

$$\begin{cases} \lim_{x\to 1^+} f(x) = \lim_{x\to 1^+} (-2x+4) = 2 \\ \lim_{x\to 1^-} f(x) = \lim_{x\to 1^-} (2x) = 2 \end{cases}$$

☺

$$= 2$$

$$\lim_{x\to \infty} (-2x+4) = \infty$$



$$\lim_{x\to 0^+} 2x = 0$$

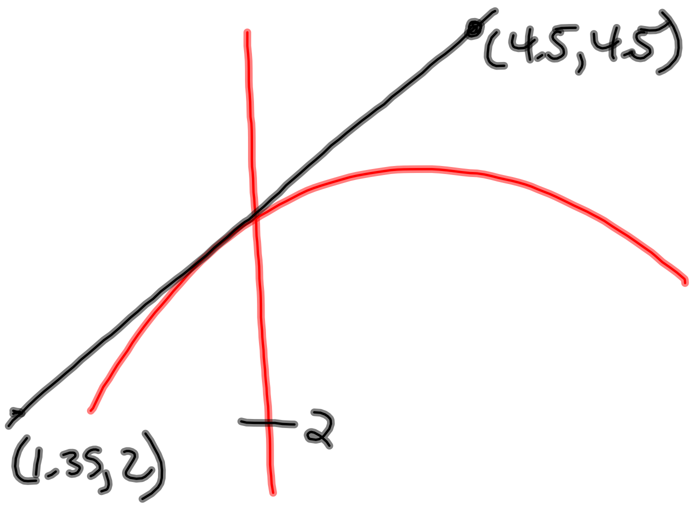
$$\lim_{x\to 0^-} f(x) = \text{undef.}$$

7) $\lim_{x\to\infty} \dfrac{8x^3+2x^2+x+100}{4x^4}$ "$\dfrac{1}{x}$"

$= \lim_{x\to\infty} \dfrac{\frac{8}{x}+\frac{2}{x^2}+\frac{1}{x^3}+\frac{100}{x^4}}{4}$

$= \dfrac{0}{4} = 0$

8)



$$m = \frac{4.5-2}{4.5-1.35} = \frac{2.5}{3.15}$$

$$= 0.79$$

9) $f(x) = -x^2 + 2$

$$\lim_{h \to 0} \frac{f(x+h) - f(x)}{h} = \lim_{h \to 0} \frac{-(x+h)^2 + 2 - (-x^2 + 2)}{h}$$

$$= \lim_{h \to 0} \frac{-(\cancel{x^2} + 2xh + h^2) + \cancel{2} + \cancel{x^2} - \cancel{2}}{h} = \lim_{x \to h} \frac{-2xh - h^2}{h}$$

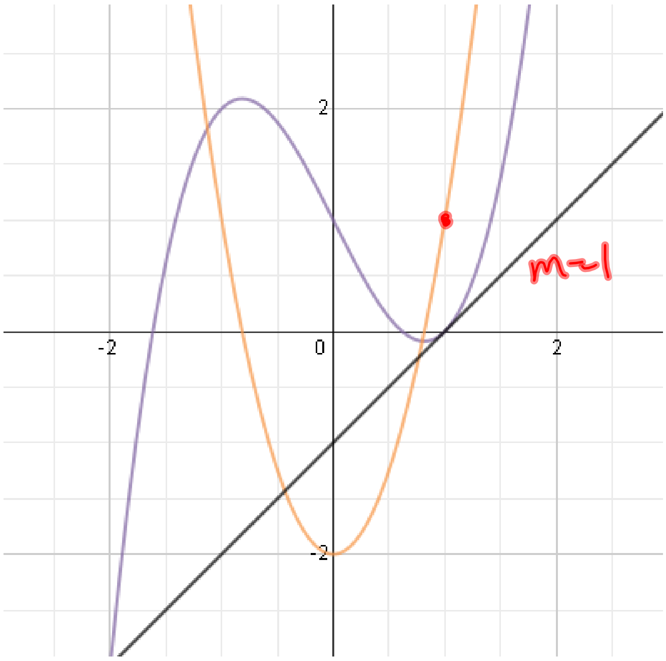
$$= \lim_{h \to 0} \frac{\cancel{h}(-2x - h)}{\cancel{h}} = -2x$$

$f'(x) = -2x$

10) $f(x) = x^3 - 2x + 1$

$f'(x) = 3x^2 - 2$

$m_T = f'(1) = 1$ ✓



$(x, f(x))$

$(1, f(1))$ $f(1) = 1 - 2 + 1$

$(1, 0)$ ✓

$y - 0 = 1(x - 1)$ $y = x - 1$