① $3y + kx = 4$

$3y = 4 - kx$

$y = \frac{4}{3} - \frac{k}{3}x$ Slope $= -\frac{k}{3}$

a) A horizontal line has slope $= 0$

$-\frac{k}{3} = 0$

$\Rightarrow \boxed{k = 0}$

b) $6x - 3y = 5$ parallel slop(e)

$-3y = 5 - 6x$ $-\frac{k}{3} = 2$

$y = -\frac{5}{3} + 2x$ $-k = 6$

Slope $= 2$ $\boxed{k = -6}$

c) x-intercept $\Rightarrow y = 0$ ∴ Point (

$3(0) + k\left(\frac{7}{3}\right) = 4$

$\frac{7k}{3} = 4$

$k = 4 \cdot \frac{3}{7} = \boxed{\frac{12}{7}}$

② $y = -3x + 5$ ∥ Slope $= +\frac{1}{3}$ Point $(4,1)$

slope $= -3$ $\boxed{y - 1 = \frac{1}{3}(x - 4)}$

③ ⓐ $\frac{h(2) - h(-2)}{2 - (-2)} = \frac{-3 - 1}{4} = \frac{-4}{4} = \boxed{-1}$

ⓑ $\frac{h(5) - h(-1)}{5 - (-1)} = \frac{-5\frac{2}{3} - (-1)}{6} = \frac{-\frac{17}{3} + \frac{3}{3}}{6} = -\frac{14}{3} \cdot \frac{1}{6} = \boxed{\frac{-7}{9}}$

ⓒ $\frac{f(0) - f(-5)}{0 - (-5)} = \frac{7 - 0}{5} = \boxed{\frac{7}{5}}$

ⓓ $h(f(2)) = h(3) = \boxed{-7}$

ⓔ $h(x) = -3$ at $\boxed{x = 0 \text{ and } x = 2}$

ⓕ $2h(4) - f(h(-4))$

$2 \cdot \left(\frac{-20}{3}\right) - f(0)$

$\frac{-40}{3} - 7$

$\frac{-40 - 21}{3}$

$\boxed{\frac{-61}{3}}$

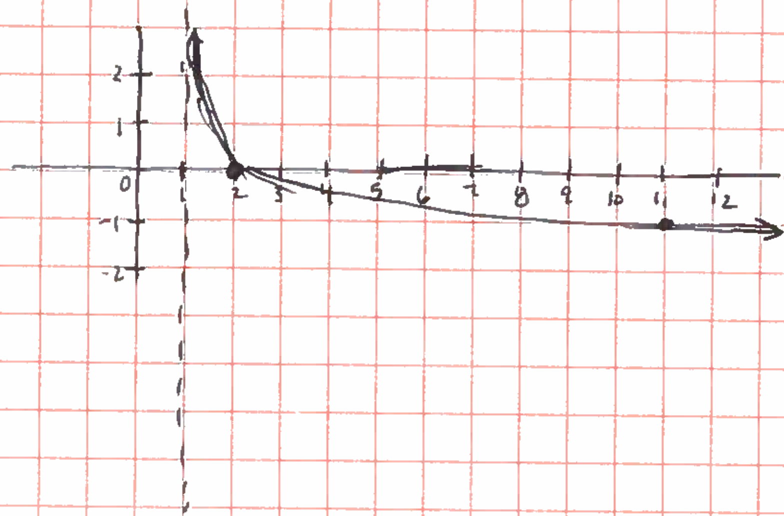
④ⓐ $y = -\log(x-1)$

Parent function: $y = \log x$

Anchor points ⇒ VA $x = 0$

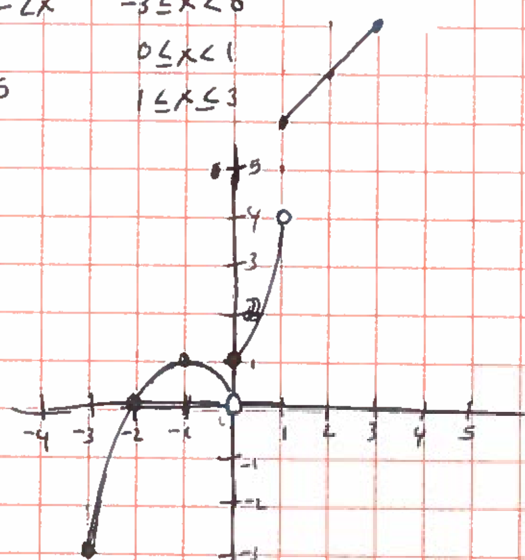
$(1,0)$

$(10,1)$



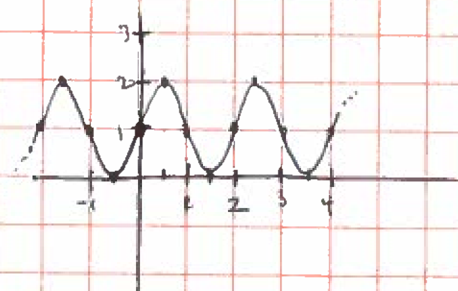
ⓑ

$$y = \begin{cases} -x^2 - 2x & -3 \le x < 0 \\ 4^x & 0 \le x < 1 \\ x + 5 & 1 \le x \le 3 \end{cases}$$

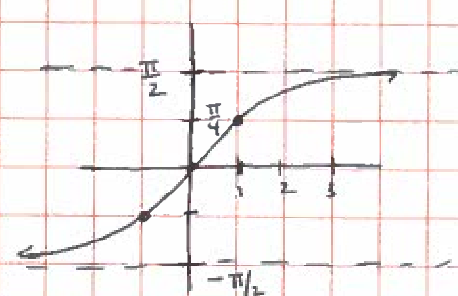


ⓒ $y = \sin(\pi x) + 1$

Period $= \frac{2\pi}{\pi} = 2$



ⓓ $y = \tan^{-1} x$



⑤ y-intercept ... plug in $x=0$ ... f $-1<0<2$

a) so $y = 0^2 = 0$

y-intercept $= (0,0)$

b) $3 \cdot y(3/2) - y(y(-2))$ $\qquad y(3/2) = (\frac{3}{2})^2 = 9/4$

$3 \cdot \frac{9}{4} - y(3)$ $\qquad y(-2) = -3/2(-2) = 3$

$\frac{27}{4} - 7$ $\qquad \Rightarrow y(3) = 2(3)+1 = 7$

$\frac{27}{4} - \frac{28}{4} = \boxed{-1/4}$

⑥

ⓐ $W(t) = \begin{cases} 12t & \text{if } 0 \le t \le 25 \\ 24(t-25)+300 & 25 < t \le 55 \\ 20(t-55)+1020 & 55 < t \le 100 \end{cases}$

when $t = 25$, $w(25) = 12(25) = 3$

when $t = 55$ $\quad w(25) = 24(30) + 300$

ⓑ $w(t)$ is the amount of water in $\boxed{cm^3}$ that has leaked out of t water tower after t-minutes.

ⓒ $w(60) = 20(60-55) + 1020 = 1120$

At $t = 60$ min, ~~there have been~~ $1{,}120\ cm^3$ of water has leak out of the water tower

⑦ $f(g(x)) = g(f(x))$

$\frac{4}{(2x)-1} = 2\left(\frac{4}{x-1}\right)$

$\frac{4}{2x-1} = \frac{8}{x-1}$

$4(x-1) = 8(2x-1)$

$4x - 4 = 16x - 8$

$4 = 12x$

$1/3 = x$ Ⓐ

⑧ $\frac{\cos\left(\frac{\pi/2}{2}\right) - \cos\left(\frac{\pi/3}{2}\right)}{\pi/2 - \pi/3} = \cos(\pi$

$= \frac{\sqrt{2}}{2}$ -

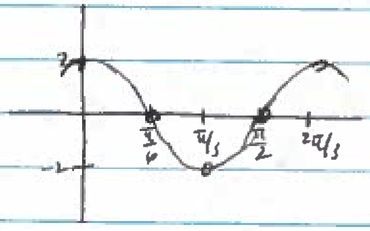
π

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

$= \boxed{3(\sqrt{2}}$

π

(9) (a) $v(t) = 2\cos(3t)$ Period $= 2\pi/3$



$a = \pi/6$

(b) $x(a) - x(0)$

$x(\pi/6) - x(0)$

$\sin(2\cdot\pi/6) - \sin(2\cdot 0)$

$\sin(\pi/3) - 0$

$\sqrt{3}/2 - 0$

$\sqrt{3}/2$

(10) (a) $-\ln(300 - w) = \frac{t}{7} + C$

$-\ln(300 - 50) = \frac{0}{7} + C$

$-\ln(250) = C$

(b) $-\ln(300 - w) = \frac{t}{7} - \ln(250)$

$\ln(300 - w) = -t/7 + \ln(250)$

$300 - w = e^{-t/7 + \ln(250)}$

$300 - e^{-t/7 + \ln(250)} = w$

(OR)

$300 - e^{-t/7} \cdot e^{\ln(250)} = w$

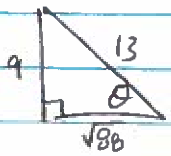
$300 - 250e^{-t/7} = w$

(11) $\sqrt{\frac{a^{2n+2} \cdot a^{n-3}}{a^{n-5}}} = \sqrt{\frac{a^{3n-1}}{a^{n-5}}} = \sqrt{a^{3n-1-n+5}} = \sqrt{a^{2n+4}} = (a^{2n+4}$

$= (a^{n+2}$

(12) $\cos(\sin^{-1}(9/13))$

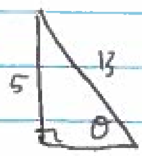
$\cos(\theta)$



$\frac{\sqrt{88}}{13} = \frac{2\sqrt{22}}{13}$

(13) $\tan^{-1}(-5/12) = \theta$

θ is in (QIV)



$\sin\theta =$

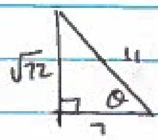
$\csc\theta =$

$\cos\theta =$

$\sec\theta =$

(14) (a) $\sin(\cos^{-1}(7/11))$

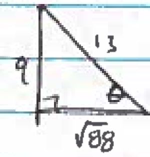
$\sin(\theta)$



$\boxed{\frac{\sqrt{72}}{11}} = \boxed{\frac{6\sqrt{2}}{11}}$

(b) $\tan(\sin^{-1}(9/13))$

$\tan(\theta)$



$\boxed{\frac{9}{\sqrt{88}}} = \frac{9}{2\sqrt{22}}$

$= \boxed{\frac{9\sqrt{22}}{44}}$

(15) (a) $x = \frac{3y-1}{y-9}$

$x(y-9) = (3y-1)$

$xy - 9x = 3y - 1$

$xy - 3y = 9x - 1$

$y(x-3) = 9x - 1$

$\boxed{y = \frac{9x-1}{x-3}}$

(b) $\ln(y) - \ln(\frac{1}{y}) = 2$

$\ln(y) - \ln(y^{-1}) = 2$

$\ln(y) + \ln(y) = 2$

$2\ln(y) = 2$

$\ln(y) = 1$

$\boxed{y = e}$

(16) (a) $\frac{4^{x-5} \cdot 8^{2x-4}}{2^{x+6}} = \frac{2^{2x-10} \cdot 2^{6x-12}}{2^{x+6}} = 2^{2x-10+6x-12-(x+6)}$

$= \boxed{2^{7x-28}}$

$(4 = 2^2)$ $(8 = 2^3)$

(b) $\sqrt{125^{4-2x} \cdot 5^{2x+2}} = \sqrt{5^{12-6x} \cdot 5^{2x+2}} = \sqrt{5^{-4x+14}} = (5^{-4x+14})^{1/2} = \boxed{5^{-}}$

(17) (a) $\ln(e^{2x}) = \boxed{2x}$ (b) $\ln \sqrt[3]{e^2} = \ln e^{2/3} = \boxed{2/3}$ (c) $e^{\ln(x+2)} = \boxed{x+2}$

(d) $e^{\ln x + 2} = e^{\ln x} \cdot e^2 = \boxed{xe^2}$ (e) $e^{2\ln 5} = e^{\ln 25} = \boxed{25}$

(18) $\ln(1-B) = \frac{1}{2}x^2 + C$

$1 - B = e^{\frac{1}{2}x^2 + C}$

$\boxed{1 - e^{\frac{1}{2}x^2+C} = B}$

(19) $(x^{1/3} + x^{-1/3})(x^{2/3} - 1 + x^{-2/3}) = x^1 - x^{1/3} + x^{-1/3} + x^{1/3} - x^{-1/3} + x^{-1}$

$= \boxed{x + \frac{1}{x}}$

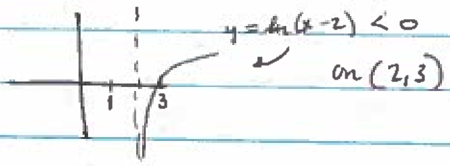
(20) $2e^{-x}x^2 + e^{-x}x = 0$

$xe^{-x}(2x + 1) = 0$ (B)

$\boxed{x = 0}$ or $e^{-x} = 0$ never happens! or $2x + 1 = 0$

$\boxed{x = -1/2}$

(21) $\ln(x-2) < 0$



(C)

(22) $f(x) = 3 - \ln(x+4)$

(a) Domain: $x + 4 > 0$
$x > -4$

(b) Range: $\mathbb{R}$

(c) x-intercepts... Make y=0

$0 = 3 - \ln(x+4)$

$\ln(x+4) = 3$

$x + 4 = e^3$

$\boxed{x = e^3 - 4}$

(d) $x = 3 - \ln(y+4)$

$\ln(y+4) = 3 - x$

$y + 4 = e^{3-x}$

$y = e^{3-x} - 4$

$\therefore f^{-1}(x) = e^{3}$

(23) (a) $\frac{R(5) - R(2)}{5 - 2} = \frac{[7\ln(7)] - [2 + 4e^{1}]}{3} \approx .249$

(b) $R(0) = 2 + 4e^{0-1} = 2 + 4e^{-1} \approx 3.472$

(24) (a) $A(0) = 3000$ ladybugs

$D(0) = 4500$ ladybugs

(b) $D(4) = 4017.047446$

after 4 days there are approx 4017 ladybugs left in the population that had a pesticide applied

(c) $4000 = 3000e^{.01t}$

$4/3 = e^{.01t}$

$\ln(4/3) = .01t$

$\frac{\ln(4/3)}{.01} = t$

after $t \approx$ 28.768 days the growing colony will have a populatio

(d) $A(t) = D(t)$

y_1 y_2 graph both & calculate the intersection

After ≈ 10.563786 days the populations will be the s.

(10.564)

(25)

(a) What is I_E when $x = 70$?

$$\log\left(\frac{I_E}{12}\right) = -.00235(70)$$

$$\log\left(\frac{I_E}{12}\right) = -.1645$$

$$\frac{I_E}{12} = 10^{-.1645}$$

$$I_E = 12 \cdot 10^{-.1645} \approx 8.216 \text{ Lumens}$$

(b) $\log\left(\frac{I_s}{12}\right) = -.00125x$

$\log\left(\frac{2.8}{12}\right) = -.00125x$

$505.6185718 \approx x$

At a depth of ≈ 505.619 fe[et] in Lake superior, the intensit[y of] light is approx 2.8 Lumens

(c) $\log\left(\frac{I_E}{12}\right) = -.00235x$

$\frac{I_E}{12} = 10^{-.00235x}$

$I_E = 12 \cdot 10^{-.00235x}$

$\log\left(\frac{I_s}{12}\right) = -.00125x$

$\frac{I_s}{12} = 10^{-.00125x}$

$I_s = 12 \cdot 10^{-.00125x}$

$$12 \cdot 10^{-.00235x} = 12 \cdot 10^{-.00125x}$$

$$x = 0$$

The only time the intensity of light is the same for lake Erie & Lake superior is at a depth of 0 (th

(26) (a) $f(x) = \log_3(x-5) + \log_3(x)$

$f(x) = \log_3(x^2-5x)$

$f(7) = \log_3(7^2-5\cdot7) = \log_3(14) \approx 2.402$

(b) $h(x) = f(x) - g(x)$

$h(x) = \log_3(x^2-5x) - \log_3(6-4x)$

$h(x) = \log_3\left(\frac{x^2-5x}{6-4x}\right)$

$h(1) = \log_3\left(\frac{1^2-5\cdot1}{6-4\cdot1}\right) = \log_3\left(\frac{-4}{2}\right)$ NOT possible!

$h(1)$ Does NOT exi

(c) $\log_3(x-5) + \log_3(x) = \log_3(6-4x)$

$\log_3\left(\frac{x-5}{x}\right) = \log_3(6-4x)$

$\frac{x-5}{x} = 6-4x$

$x-5 = 6x-4x^2$

$4x^2-5x-5=0$

$x = \frac{5 \pm \sqrt{25-4(4)(-5)}}{2(4)} \approx 1.905868846$ or $-.655868457$ } neither c will w Both are

$\therefore f(x)$ will NEVER EQUA