Homework 1-5

① $\cos(x)$ $x \in [0, \pi]$ ✓

2^t ✓ one-one

$7t^2+8$ $x \in (-\infty, 0]$ ✓

$|x|+7$ ✗ function

$(x-7)^2$ $x \in [6,8]$ ✗

$3\sqrt{t}+2$ ✓

② $f(x) = \frac{1+3x}{5-4x}$

$y(5-4x) = 1+3x$

$5y - 4xy = 1+3x$

$3x + 4xy = 5y - 1$

$x(3+4y) = 5y-1$

$f^{-1}(x) = 5y-1/3+4y$

③ $C = \frac{5}{9}(F-32)$;

$\frac{9C}{5} = F-32$; $F = \frac{9C}{5}+32$

$R \nearrow$ $C^{-1}(F) = \frac{9F}{5}+32 \nearrow D$

$D: [-459, \infty)$; $R: [273.15, \infty)$

flip Domain and Range values

④ $f(x) = 1+\sqrt{4+7x}$

$(y-1)^2 = 4+7x$

$x = \frac{1}{7}((y-1)^2-4)$

$D: [\frac{4}{7}, \infty)$; $R: [1, \infty)$ $\nearrow D$

⑤ $13 = 45(1.6)^x$

$\ln(13) = \ln(45) + x\ln(1.6)$

$\frac{\ln(13)-\ln(45)}{\ln(1.6)} = x$

⑥ $f(x) = 4^{6^x}$

$\ln(y) = 6^x \ln(4)$

$\frac{\ln(\ln(y))-\ln(\ln(4))}{\ln(6)} = x$

⑧ match the following not too bad

⑨ $2^{\log_2 8 + \log_2 9}$

$2^{\log_2 72} \Rightarrow (72)$

and

$e^{8\ln(5)}$

$e^{\ln(5)^8} \Rightarrow (5^8)$

⑬ $2e^{3\ln A} = \boxed{2A^3}$

(10) $7e^{5x} = 10e^{8x}$

$\ln(7) + \ln(e)^{5x} = \ln(10) + \ln(e)^{8x}$

$\ln(\frac{7}{10}) = 8x - 5x$ where

$x = \frac{\ln(7/10)}{3}$

(11) $5^{x-1} = 2^{2x+1}$

$(x-1)\ln(5) = (2x+1)\ln(2)$

$x\ln(5) - \ln(5) = 2\ln(2)x + \ln(2)$

$x\ln(5) - 2\ln(2)x = \ln(10)$

$x = \ln(10) \div \ln(5/4)$

(12) $Pf^t = Qb^t$

$\ln(P) + t\ln(f) = \ln(Q) + t\ln(b)$

$t(\ln(\frac{f}{b})) = \ln(Q/P)$

then $t = \ln(Q/P) \div \ln(f/b)$

(14) match the following pretty pretty easy

(15) $\sin(\sin^{-1}(0.7)) = 0.7$

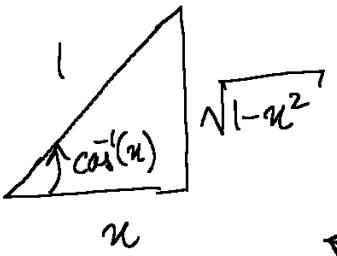
$\tan^{-1}(\tan(\frac{4\pi}{3})) = \pi/3$ ← Principle arc: else it is a fave

(16) $\tan^{-1}(\sqrt{3}) = \pi/3$

$\arcsin(\frac{-\sqrt{2}}{2}) = \frac{-\pi}{4}$

↑ only cosine goes from $[0, 2\pi]$

(17) $\sin(2\cos^{-1}(x))$



$1^2 + x^2 = c^2$

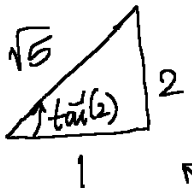
$c = \sqrt{1-x^2}$

pythagoras th.

$\sin(2\theta) = 2\sin\theta\cos\theta$ then

$2x\sqrt{1-x^2}$ based on the Δle

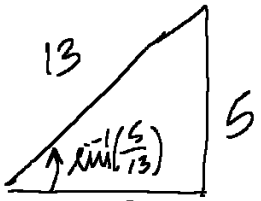
(18) $\sec[\tan^{-1}(2)]$



then $2^2 + 1^2 = \sqrt{5}$ pythagoras th.

$\frac{1}{\cos\theta} = \frac{1}{\sqrt{5}}$; then $\sec\theta = \boxed{\sqrt{5}}$

(b) $\cos(2\sin^{-1}(\frac{5}{13}))$;



$5^2 + 12^2 = 13^2$

pythagoras

$\cos 2\theta = 1 - 2\sin^2\theta$; $1 - 2\left[\frac{5}{13}\right]^2 = \boxed{\frac{119}{169}}$

⑦ doubling time if 6% ↑

$$10(1.06)^n = 20$$

$$1.06^n = 2 \; ; \; \ln(n)$$

$$n \ln(1.06) = \ln(2)$$

$$n = \frac{\ln(2)}{\ln(1.06)} \approx 11.89 \text{ years}$$