Cal: § 1.3, 5, 6 Assignment 2 p.55 (1, 2, 3, 4), p.56 (54, 56-60, 62, 65, 68-70) Korpi Period 5, 32

p.55 ① $f(x) = -\log_2(x+3)$

what is domain?

$x+3 > 0$

$x > -3$ or $(-3, \infty)$

C

② $f(x) = 5\cos(x+\pi)+3$

what is range?

up 3, Amp of 5

R: $[3-5, 3+5]$

$[-2, 8]$

D

③ $\tan x = -1$

$\frac{3\pi}{4} = x$

$\frac{7\pi}{4} = x$

only solution is in QII or QIV

None in $(\pi, \frac{3\pi}{2})$ → QIII

④ $f(x) = 5x - 3$

a) find $g = f^{-1}(x)$

$y = 5x - 3$

$x = 5y - 3$

$5y = x + 3$

OR $y = \frac{1}{5}x + \frac{3}{5}$

$y = \frac{x+3}{5} = g(x)$

b) Find $fog(x)$

$f(g(x))$

$f\left(\frac{1}{5}x + \frac{3}{5}\right)$

$5\left(\frac{1}{5}x + \frac{3}{5}\right) - 3$

$x + 3 - 3$

X

c) $gof(x)$

$g(f(x))$

$g(5x-3)$

$\frac{1}{5}(5x-3) + \frac{3}{5}$

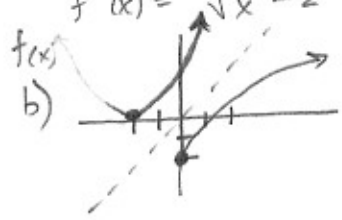
$x - \frac{3}{5} + \frac{3}{5}$

X

p.56 (54) a) f^{-1}, $f(f^{-1}(x)) = f^{-1}(f(x))$; $f(f^{-1}(x))$ $f^{-1}(f(x))$

$f(x) = (x+2)^2$, $x \geq -2$

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



b)

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

$(\sqrt{x} - 2 + 2)^2$ $\sqrt{(x+2)^2} - 2$

$(\sqrt{x})^2$ $x + 2 - 2$

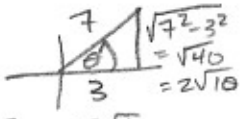
X X

(56) $\tan^{-1}(-2.3)$

≈ -1.1607 rads

$\approx -66.5014°$

(57) $\theta = \cos^{-1}\left(\frac{3}{7}\right)$



$\cos\theta = \frac{3}{7} = \frac{x}{r}$

$\sin\theta = \frac{2\sqrt{10}}{7}$ $\csc\theta = \frac{7}{2\sqrt{10}} = \frac{7\sqrt{10}}{20}$

$\cos\theta = \frac{3}{7}$ $\sec\theta = \frac{7}{3}$

$\tan\theta = \frac{2\sqrt{10}}{3}$ $\cot\theta = \frac{3}{2\sqrt{10}} = \frac{3\sqrt{10}}{20}$

(58) Solve $\sin x = -0.2$

a) $0 \leq x < 2\pi$

$x \approx 3.3430$, $x \approx 6.0818$

b) $-\infty < x < \infty$

$x \approx 3.3430 + 2\pi n$, $n \in \mathbb{Z}$

$x \approx 6.0818 + 2\pi n$, $n \in \mathbb{Z}$

(59) Solve:

$e^{-0.2x} = 4$

$\ln e^{-0.2x} = \ln 4$

$-0.2x = \ln 4$

$x = \frac{\ln 4}{-2/10}$

$x = -5\ln 4$

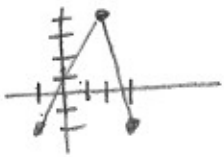
(60)

a) $y = f(-x)$ (y-axis reflect)

b) $y = -f(x)$ (x-axis reflect)

c) $y = -2f(x+1)+1$

d) $y = 3f(x-2)-2$



(62) Purchase \$100,000 dep @ \$10,000/yr for 10 yrs. Value at time x

a) $V = 100{,}000 - 10{,}000x$

b) $V = \$55{,}000 = 100{,}000 - 10{,}000x$

$x = 4.5$ yrs

§1.3, 5, 6 cont

(65) Guppies double daily
@ $t=0$, Guppies = 4

a) $y = a \cdot b^t$

$\boxed{G = 4 \cdot 2^t}$

b) @ $t = 4$ days

$G = 4 \cdot 2^4 = \boxed{64 \text{ Guppies}}$

@ $t = 1 \text{ week} = 7 \text{ days}$

$G = 4 \cdot 2^7 = \boxed{512 \text{ Guppies}}$

c) 2000 Guppies?

$2000 = 4 \cdot 2^t$

$2^t = 500$

$t \cdot \ln 2 = \ln 500$

$t = \frac{\ln 500}{\ln 2} \approx \boxed{8.9658 \text{ days}}$

d) Because it suggests the number of guppies will continue to double indefinitely and become arbitrarily large, which is impossible due to the finite size of the tank and oxygen supply in the water.

(68) $P(-2,1)$, $\ell: x+y=2$

a) slope of ℓ: $y = -x+2 \rightarrow \boxed{m=-1}$

b) line parallel to ℓ; $P(-2,1)$, $m=-1$

$y-1 = (-1)(x+2)$

$y = -x-2+1$

$\boxed{y = -x-1}$

c) line perpendic. to ℓ

$P(-2,1)$, $m_\perp = 1$

$y-1 = 1(x+2)$

$\boxed{y = x+3}$

d) x-int of ℓ?

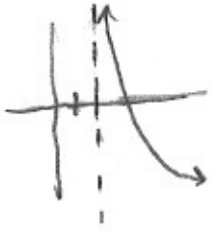
$y=0$:

$0 = -x+2$

$\boxed{x=2}$

(69) $f(x) = 1 - \ln(x-2)$

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



a) $x-2>0$

$x>2$

$D: \{x \mid x>2\}$

b) $R: \mathbb{R}$

c) x-int: $y=0$

$0 = -\ln(x-2)+1$

$\ln(x-2) = 1$

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

$x-2 = e$

$\boxed{x = e+2}$

≈ 4.718

d) f^{-1}: $y = -\ln(x-2)+1$

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

$x-1 = -\ln(y-2)$

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

$y-2 = e^{1-x}$

$y = e^{1-x}+2$

$\boxed{f^{-1}(x) = e^{1-x}+2}$

e) $f(f^{-1}(x)) = -\ln\left((e^{1-x}+2)-2\right)+1$

$= -\ln e^{1-x}+1$

$= -(1-x)+1 = x-1+1$

$= \boxed{x}$

(70) $f(x) = 1 - 3\cos 2x = -3\cos 2x + 1$

a) Domain: $\mathbb{R}$ or $(-\infty, \infty)$

b) Range: Amp = 3, up 1

$\{y \mid -2 \le y \le 4\}$

c) Period $= \frac{2\pi}{B}$, $B=2$

$P = \frac{2\pi}{2} = \boxed{\pi}$

d) is f Ev, Odd, N?

$f(-x) = -3\cos(2(-x))+1$

$= -3\cos(2x)+1$

$= f(x)$

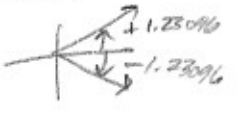
So $f(x)$ is Even function.

e) zeros of f in $\frac{\pi}{2} \le x \le \pi$. (QII)

algebraic: $-3\cos 2x + 1 = 0$

$\cos 2x = \frac{1}{3}$ ← not on unit circle so find on calculator

$2x = \cos^{-1}(1/3)$



$2x = 1.23096 + 2\pi n$

or $2x = -1.23096 + 2\pi n$

$x = 0.61548 + \pi n$

or $x = -0.61548 + \pi n$ → generate solutions in $[\frac{\pi}{2}, \pi]$

$\boxed{x = 2.526}$

* you can graph eq in y_1: in Xwindow $[\frac{\pi}{2}, \pi]$ and find x-intercept

— Kaypi