

UNIT 3 - CHAPTER 5 (5.1-5.6) NOT REVISED IN 5.7/8.8

SKILLS CHECK

① $f(x) = \frac{x}{x-1}$

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

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

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

② $f(x) = ax - b$

$g(x) = \frac{x+b}{a}$

$f(g(x)) = a \left(\frac{x+b}{a} \right) - b$

$= x + b - b$

$= x$

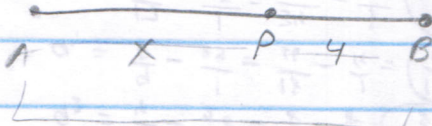
$g(f(x)) = \frac{ax-b+b}{a}$

$= \frac{ax}{a}$

$= x$

GOLDEN RATIO = Φ

$\frac{AB}{AP} = \frac{AP}{PB}$



EXPLORER

$\log 20$
 $\log(4 \cdot 5)$
 $\log 4 + \log 5$
 $\log 2^2$
 $2 \log 2 + \log 5$
 $\log(xy)$
 $\log x + \log y$

5.1 - GOLDEN RATIO + RECURSIVE FUNCTIONS

SA - RECURSIVE FXNS

$\log_3 2$

$\log 2 + \log 81$

$\log(2 \cdot 81)$

$\frac{\log 2}{\log 3} + \frac{\log 81}{\log 3}$

$\log_3 5 = x$

$3^x = 5$

$\log 3^x = \log 5$

$\frac{x \log 3}{\log 3} = \frac{\log 5}{\log 3}$

$\frac{\log 81}{\log 3} = 4 \log_3 3$

$\log_3 81$

$3^x = 81$

$x = 4$

A.P. 237

#1-4

JUST 3c or 4b)

① $a_1 = 1$

$$a_2 = \frac{1}{1+1} = \frac{1}{2}$$

$$a_3 = \frac{1/2}{1+1/2} = \frac{1/2}{3/2} = \frac{1}{3}$$

$$a_4 = \frac{1/3}{1+1/3} = \frac{1/3}{4/3} = \frac{1}{4}$$

$$a_5 = \frac{1}{5}$$

$$a_n = \frac{1}{n} \quad \text{--- X}$$

② $a_1 = 2$

$$a_2 = \frac{2}{1-2} = -2$$

$$a_3 = \frac{-2}{1-(-2)} = -\frac{2}{3}$$

$$a_4 = \frac{-2/3}{1-(-2/3)} = \frac{-2/3}{5/3} = -\frac{2}{5}$$

$$a_5 = \frac{-2/5}{1-(-2/5)} = \frac{-2/5}{7/5} = -\frac{2}{7}$$

$$a_n = \frac{-2}{2n-3}$$

③ $a_0 = 2$

$$a_n = a_{n-1} - \frac{1}{2^n}$$

a) $a_1 = 2 - \frac{1}{2} = \frac{3}{2}$

$$a_2 = \frac{3}{2} - \frac{1}{2^2} = \frac{6}{4} - \frac{1}{4} = \frac{5}{4}$$

$$a_3 = \frac{5}{4} - \frac{1}{2^3} = \frac{10}{8} - \frac{1}{8} = \frac{9}{8}$$

$$a_4 = \frac{9}{8} - \frac{1}{2^4} = \frac{18}{16} - \frac{1}{16} = \frac{17}{16}$$

$$a_5 = \frac{17}{16} - \frac{1}{2^5} = \frac{34}{32} - \frac{1}{32} = \frac{33}{32}$$

b) $a_n = \frac{2^n + 1}{2^n}$

④ $a_1 = 1$

$$a_n = a_{n-1} + (2n-3)$$

a) $a_1 = 1$

$$a_2 = 1 + (2(2)-3) = 2$$

$$a_3 = 2 + (2(3)-3) = 5$$

$$a_4 = 5 + (2(4)-3) = 10$$

$$a_5 = 10 + (2(5)-3) = 17$$

QUADRATIC

SB p. 240

1-6

① a. $(64)^{2/3} = (\sqrt[3]{64})^2 = 4^2 = 16$

b. $(\frac{8}{27})^{1/3} = \frac{2}{3}$

c. $(\frac{81}{16})^{-3/4} = (\sqrt[4]{\frac{81}{16}})^{-3} = (\frac{3}{2})^{-3} = \frac{8}{27}$

② a. $(\frac{b^{-3}x^{-2}}{8x})^{-2/3} = (\frac{1}{b^3 8x^3})^{-2/3} = (8b^3x^3)^{2/3} = (2bx)^2 = 4b^2x^2$

b. $\frac{a^{-1} - a^{-2}}{a^{-3}} = \frac{\frac{1}{a} - \frac{1}{a^2}}{\frac{1}{a^3}} = \frac{a^3}{a^3} (a^2 - a) = a^2 - a = a(a-1)$

c. $\frac{x^3 \cdot x^{-7}}{x^{-4}} = \frac{x^{-4}}{x^{-4}} = 1$

③ $\sqrt{y^3} \div \sqrt[3]{y^2} = y^{3/2} \div y^{2/3} = y^{3/2 - 2/3} = y^{9/6 - 4/6} = y^{5/6} = y$

④ $(64)^{5/6} = (\sqrt[6]{64})^5 = 2^5 = 32$

④ $\frac{(x^4 y z^{-3})^2 \cdot \sqrt{x^{-5} y^2 z}}{(xz)^{7/2}} = \frac{x^8 y^2 z^{-6} \cdot x^{-5/2} y z^{1/2}}{x^{7/2} z^{7/2}} = \frac{x^{11/2} y^3 z^{-11/2}}{x^{7/2} z^{7/2}} = x^2 y^3 z^{-9}$

⑤ $5 \cdot 4^{3n+1} - 20 \cdot 8^{2n}$

$5 \cdot (2^2)^{3n+1} - 20 \cdot (2^3)^{2n}$

$5 \cdot 2^{6n+2} - 20 \cdot 2^{6n}$

$5 \cdot 2^{6n} (2^2 - 4)$

0

⑥ $4^x + 2 = 3 \cdot 2^x$

$2^{2x} + 2 = 3 \cdot 2^x$

$2^{2x} - 3 \cdot 2^x + 2 = 0$

$(2^x)^2 - 3 \cdot (2^x) + 2 = 0$

$a = 2^x \leftarrow \text{FOR EASE OF USE}$

$a^2 - 3a + 2 = 0$

$(a-2)(a-1) = 0$

$a = 2, 1$

$2^x = 2 \rightarrow x = 1$
 $2^x = 1 \rightarrow x = 0$

$$y = a \cdot b^x$$

$$A = P \left(1 + \frac{r}{n}\right)^{nt}$$

SC P. 242
#1-4

① $y = a \cdot b^x$

$$450,000 = 250,000 \cdot b^{20}$$

$$b^{20} = \frac{450,000}{250,000}$$

$$b^{20} = \frac{9}{5}$$

$$b = \sqrt[20]{\frac{9}{5}} \approx 1.0298$$

3%

② a.) $1999 - 2006 = 7$ Ans

$$61.08 = 17.48 \cdot a^7$$

$$a^7 = \frac{61.08}{17.48}$$

$$a = \sqrt[7]{\frac{61.08}{17.48}}$$

$$a = 1.1957$$

19.6%

b.) $72.45 = 61.08 \cdot a^4$

$$a^4 = \frac{72.45}{61.08}$$

$$a = \sqrt[4]{\frac{72.45}{61.08}}$$

$$a = 1.061159$$

6.1%

c.) $97.87 = 72.99 \cdot a^{12}$

$$a = \sqrt[12]{\frac{97.87}{72.99}}$$

$$a = 1.024744$$

2.5%

③ SAMIRA $\Rightarrow 1000 \cdot (1.02)^{4.15} = \3281.03

HEMANTI $\Rightarrow 500 \cdot (1.08)^{15} = \1586.08

$500 \cdot (1.007)^{12 \cdot 15} = \1754.99

\$3341.07

④ AMOUNT DUE

$$15,000 \cdot 1.05 = 15750 \text{ (END Y1)} \cdot \frac{1}{3} = 5250$$

$$5,250 \cdot 1.05 = 5512.5 \text{ (END Y2)} \cdot \frac{1}{3} = 1837.5$$

$$1837.5 \cdot 1.05 = 1929.375 \text{ (END Y3)} \cdot \frac{1}{3} = 643.125$$

$$643.125 \cdot 1.05 = 675.28125 \text{ (END Y4)} \cdot \frac{1}{3} = 225.09375$$

$$225.09375 \cdot 1.05 = 236.3484375 \text{ (END Y5)} \cdot \frac{1}{3} = 78.7828125$$

\$16,069

AMT PAID

\$10,500

\$3,675

\$1,286.25

\$450.1875

\$157.505625

\$16,069.00

SD P. 247

1-5

① RED

BLUE

$$2.5 = a^1$$

$$4 = a^{-1}$$

$$a = 2.5$$

$$a = \frac{1}{4}$$

② $f(x) = 2^x$

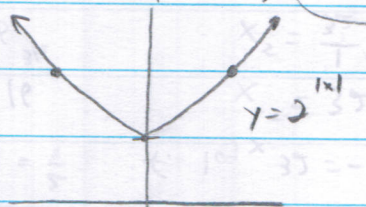
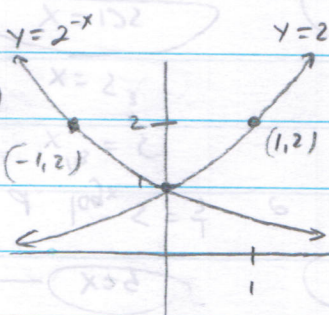
$f(x+1) = 2$

$$f(x+1) = 2^{x+1} = 2^x \cdot 2^1 = 2 \cdot 2^x$$

$$2f(x) = 2 \cdot 2^x$$

$$f(x+a) = 2^a \cdot 2^x$$

③



④

$$e^x + 1 = e^{x+1}$$

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

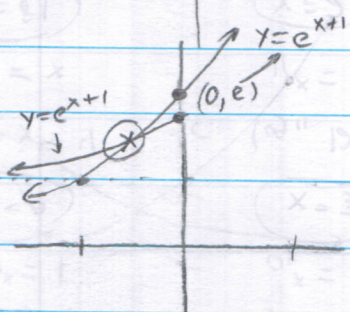
$$e^x(e-1) = 1$$

$$e^x = \frac{1}{e-1}$$

$$\ln e^x = \ln\left(\frac{1}{e-1}\right)$$

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

$$x \approx -0.5413248546$$



$y = e^x + 1$ (SHIFT $\uparrow 1$)

$y = e^{x+1}$ (SHIFT $\leftarrow 1$)

NOT SURE HOW TO SOLVE w/o NATURAL LOGS or ESTIMATING BY GRAPHS...

⑤

