

121 $\int 4.1 \#5$ 1-8 ALL, 9, 15, 19, 23, 25, 29, 33, 37, 39, 43, 47, 53, 57, 59, 61, 65, 71, 75, 103, 105

$\int 4.2 \#5$ 1-8 all, 9, 11, 28-30 ALL, 33-43 odd, 47, 53

① Functions that involve some combo of basic arithmetic operations, powers or roots are algebraic functions

② Exponential and logarithmic functions are transcendental functions

③ A function of the form $f(x) = a^x$, where $a \neq x$ are real, $a > 0$, and $a \neq 1$, is an exponential function.

④ The domain of $f(x) = a^x$ for $a > 0$ is \mathbb{R} .

⑤ $f(x) = a^x$ is increasing if $a > 1$ & decreasing if $a < 1$.

⑥ $f(x) = a^x$ has x-axis as horizontal asymptote.

⑦ The range of $f(x) = a^x$ is $(0, \infty)$

⑧ The exponential family of functions consists of all functions of the form $f(x) = b \cdot a^{x-h} + k$.

12) #4.1 #5 9, 15, 19, 23, 25, 29, 33, 37, 39, 43, 47,
53, 57, 59, 61, 65, 71, 75, 103, 105.

#5 9-20 Eval. w/o calculator

(9) $3^3 = 27$ (15) $(\frac{1}{2})^{-4} = (\frac{2}{1})^4 = 2^4 = 16$

(19) $-9^{-\frac{3}{2}} = -(9^{\frac{1}{2}})^{-3} = -3^{-3} = -\frac{1}{3^3} = -\frac{1}{27}$

#5 21-32 $f(x) = 3^x$, $g(x) = 2^{1-x}$, $h(x) = (\frac{1}{4})^x$ or 4^{-x}

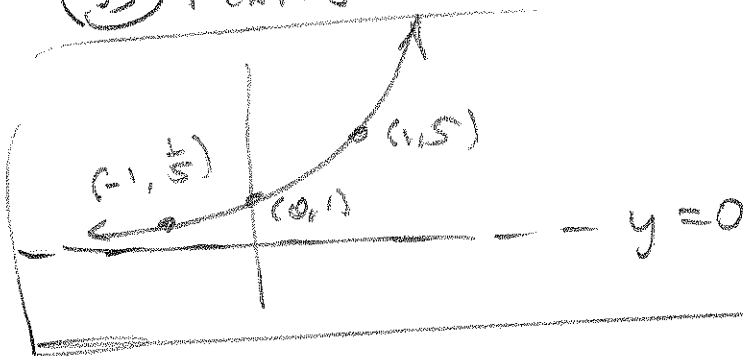
(23) $f(-2) = 3^{-2} = \frac{1}{9}$

(25) $g(2) = 2^{1-2} = 2^{-1} = \frac{1}{2}$

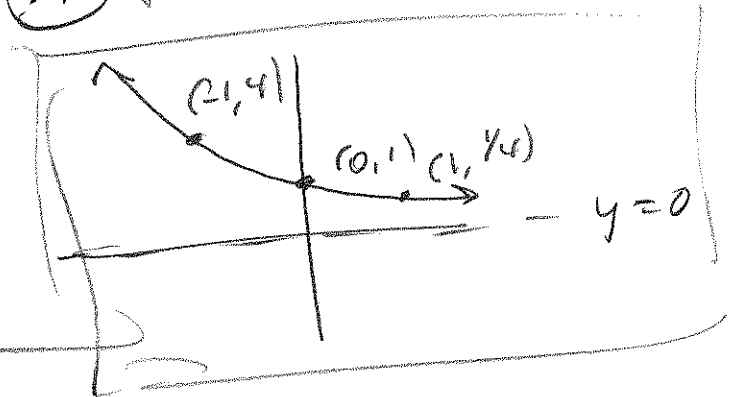
(29) $h(-1) = 4^{-(-1)} = 4$

#5 33-38 sketch.

(33) $f(x) = 5^x$



(37) $f(x) = (\frac{1}{4})^x$

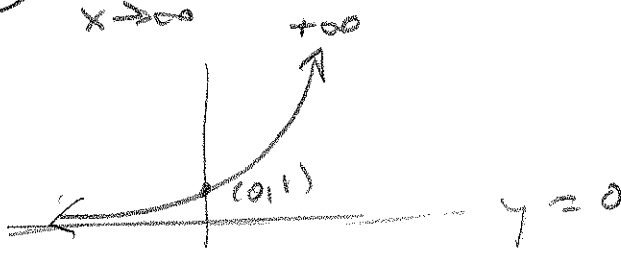


121 $\sqrt{4.1}$ #5 39, 43, 47, 53, 57, 59, 61, 65, 71, 75, 103, 105

#539 - 46 Use graph/table to find each limit.

(39) $\lim_{x \rightarrow \infty} 3^x = \infty$

$3^{1000} = \text{Huge!}$

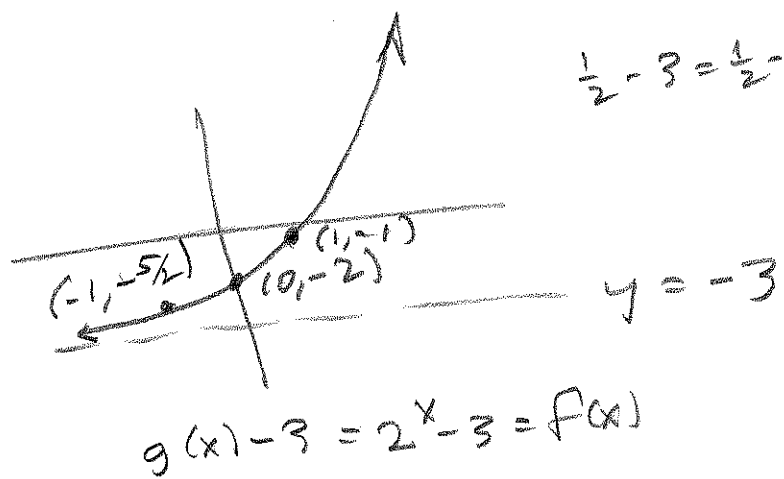
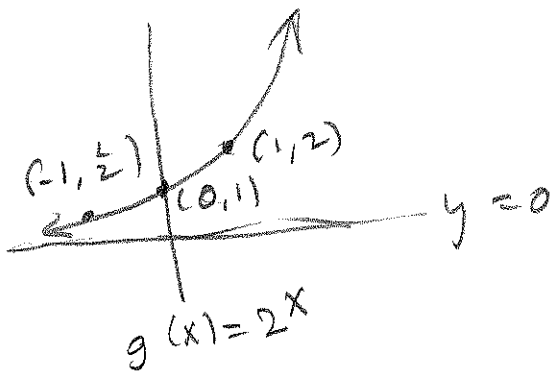


(43) $\lim_{x \rightarrow \infty} \left(\frac{1}{3}\right)^x = 0$



#5 47-58 Sketch

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

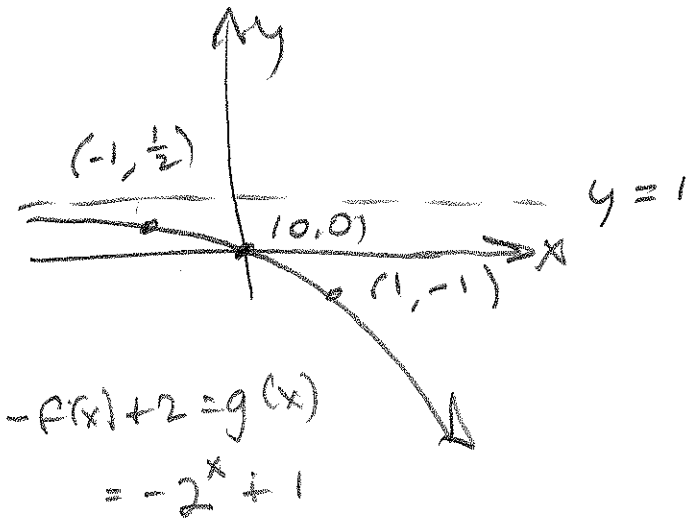
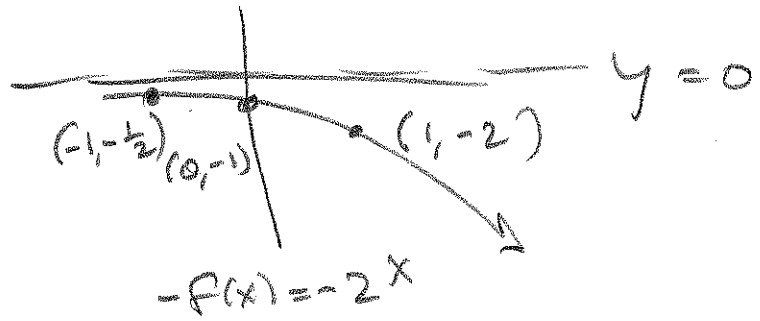
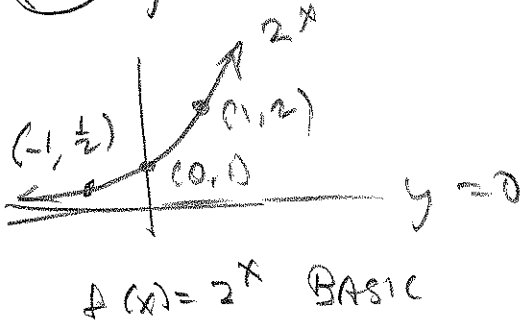


$\frac{1}{2} - 3 = \frac{1}{2} - \frac{6}{2} = -\frac{5}{2}$

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

12) #4, 1 #5 53, 57, 59, 61, 65, 71, 75, 103, 105

(53) $y = 1 - 2^x = -2^x + 1 = g(x)$



#5 59-62 write the eq'n from transformations

(59) $y = 2^x$ 5 right, 2 down

$$f(x) = 2^{x-5} - 2$$

(61) $(\frac{1}{4})^x$ 1 right, reflected in x-axis, 2 down

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

121 §4.1 #5 65, 71, 75, 103, 105

#s 63-80 Solve,

65 $10^x = 0.1 = \frac{1}{10} = 10^{-1}$

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

71 $8^x = 2$

$$(2^3)^x = 2$$

$$2^{3x} = 2^1$$

$$3x = 1$$

$$\boxed{x = \frac{1}{3}}$$

$$8^x = 2$$

$$8^x = 8^{\frac{1}{3}}$$

$$x = \frac{1}{3}$$

75 $(\frac{1}{2})^x = 8$

$$(\frac{1}{2})^x = 2^3$$

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

$$2^{-x} = 2^3$$

$$-x = 3$$

$$\boxed{x = -3}$$

$$(\frac{1}{2})^x = 8 = 2^3 = 2^{(-1)(-1)(3)}$$

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

$$(\frac{1}{2})^x = (\frac{1}{2})^3$$

$$x = -3$$

121 §4.1 #s 103, 105

(103) A deposit of $P = 5000$ earns 8% apr.

Find amt in account A end of $t = 6$ yrs
and the amt of Interest earned if interest is
compounded.

(a) ... annually : $m = 1$

$$A = P \left(1 + \frac{r}{m}\right)^{mt} = 5000 (1 + .08)^6 \approx \boxed{\$7934.37} \quad A$$

$$\text{Interest} = A - P = I \approx 7934.37 - 5000 = \boxed{\$2934.37} \quad I$$

(b) ... quarterly : $m = 4$

$$A = 5000 \left(1 + \frac{.08}{4}\right)^{4(6)} \approx \boxed{\$8042.19} \quad A$$

$$I = A - P \approx 8042.19 - 5000 = \boxed{\$3042.19} \quad I$$

(c) ... monthly $m = 12$

$$A = 5000 \left(1 + \frac{.08}{12}\right)^{12(6)} \approx \boxed{\$8067.51} \quad A$$

$$I = A - P \approx 8067.51 - 5000 = \boxed{\$3067.51} \quad I$$

(d) ... daily $m = 365$

$$A = 5000 \left(1 + \frac{.08}{365}\right)^{365(6)} \approx \boxed{\$8079.95} \quad A$$

$$I = A - P \approx 8079.95 - 5000 = \boxed{\$3079.95} \quad I$$

(e) ... continuously

$$A = Pe^{rt} = 5000 e^{(.08)(6)} \approx \boxed{\$8080.37} \quad A$$

$$I = A - P \approx 8080.37 - 5000 = \boxed{\$3080.37} \quad I$$

12) $\int 4.1 \# 105$

$\text{\$105}$ APR = 8% compounded continually, $P = \$5000$

Find future value A .

(a) 6 yrs $\approx 5e^{(.08)(6)} \approx \boxed{\$8080.37}$

(b) 8 yrs + 3 mos = 8 yrs + $(3 \text{ mos}) \left(\frac{1 \text{ yr}}{12 \text{ mos}} \right)$

= 8.25 yr \rightarrow
 $A = 5000e^{(.08)(8.25)} \approx \boxed{\$9673.96}$
 $\approx .3936073059$

(c) 5 yrs, 4 mos, 22 days
 $(4 \text{ mos}) \left(\frac{1 \text{ yr}}{12 \text{ mos}} \right) = \frac{1}{3} \text{ yr} = .\bar{3}$

$(22 \text{ days}) \left(\frac{1 \text{ yr}}{365 \text{ days}} \right) = \frac{22}{365} \approx .0602739726$

$\rightarrow 5.3936073059 = t$

$A(t) = 5000e^{.08(5.3936073059)} \approx \boxed{\$7697.74}$

(d) 20 yrs, 321 days

$(321 \text{ days}) \left(\frac{1 \text{ yr}}{365 \text{ days}} \right) \approx .8794520548$

20.8794520548 yrs

$A = 5000e^{(.08)(20.8794520548)} \approx \boxed{\$26,570.30}$