Sec 1.5 page 59 (1-5, 7, 8, 11-13, 15, 17-24, 29-31)

1) a) $\frac{2^8}{4^3} = \frac{2^8}{(2^2)^3} = \frac{2^8}{2^6} = 2^2 = \boxed{4}$

b) $\boxed{x^{-4/3}}$

2) a) $8^{4/3} = (2^3)^{4/3} = 2^4 = \boxed{16}$

b) $x(3x^2)^3 = 27x^6 x = \boxed{27x^7}$

3) a) $b^8(2b)^4 = 16b^8b^4 = \boxed{16b^{12}}$

b) $\frac{(6y^3)^4}{2y^5} = \frac{1296y^{12}}{2y^5} = \boxed{648y^7}$

4) a) $\frac{x^{2n}\cdot x^{3n-1}}{x^{n+2}} = 2n+3n-1-(n+2) = \boxed{x^{4n-3}}$

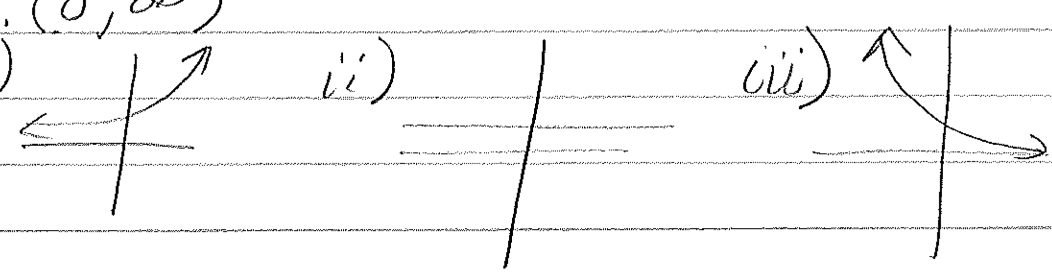
b) $\frac{\sqrt{a\sqrt{b}}}{\sqrt[3]{ab}} = \frac{a^{1/2}b^{1/4}}{a^{1/3}b^{1/3}} = \boxed{\frac{a^{1/6}}{b^{1/12}}}$ or $\boxed{a^{1/6}b^{-1/12}}$

5) a) $f(x) = a^x$; $a > 0$

b) $D: (-\infty, \infty)$

c) $R: (0, \infty)$

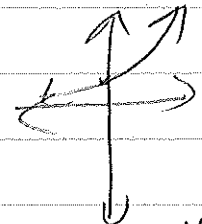
d) i) ii) iii)



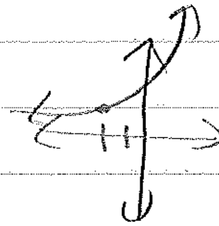
7) all intercept y axis at 1 and all increasing.

8) All intercept y axis at 1. Two are increasing two are decreasing. ~reflected @ y axis

(11)

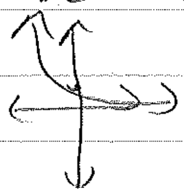


$y=10^x$

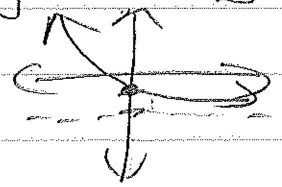


$y=10^{x+2}$

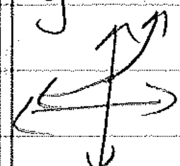
(12) $y=.5^{x}=\left(\frac{1}{2}\right)^{x}=2^{-x}$



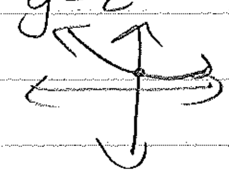
$y=.5^{x}-2$



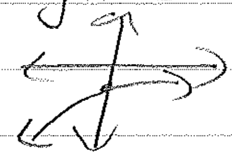
(13) $y=2^x$



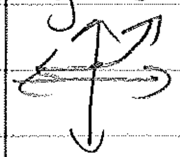
$y=2^{-x}$



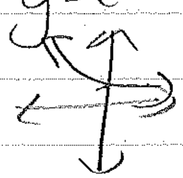
$y=-2^{-x}$



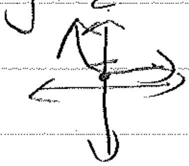
(15) $y=e^x$



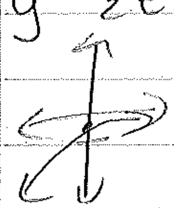
$y=e^{-x}$



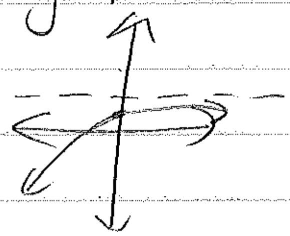
$y=\frac{1}{2}e^{-x}$



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



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



(17) a) $y=e^x-2$ b) $y=e^{x-2}$ c) $y=-e^x$

d) $y=e^{-x}$ e) $y=-e^{-x}$

(18) a) since $(0,1)$ is 3 units from $y=4$ we have to move it 6. But first we reflect it over the x axis which adds two more. This yields $f(x) = -e^{x}+8$.

b) $f(x) = e^{-(x)+4}$ or $e^{-(x-4)}$

(19) a) $1-e^{1-x^2} = 0$
$e^{1-x^2} = 1$
$\ln e^{1-x^2} = \ln 1$
$1-x^2 = 0$
$(1-x)(1+x) = 0$
$\boxed{x \neq \pm 1}$
$D: (-\infty,-1) \cup (-1,1) \cup (1,\infty)$

b) $e^{\cos x} = 0$
$\ln e^{\cos x} = \ln 0$
$e^{\cos x}$ is always >0
So $D: (-\infty,\infty)$

(20) a) all $\mathbb{R}$ so $(-\infty,\infty)$

b) $1-2^{t} \geq 0$
$1 \geq 2^{t}$
$\log_2 1 \geq \log_2 2^{t}$
$\log_2 1 \geq t$
$0 \geq t$ $D: (-\infty,0]$

(21) $6 = ca^{1} \Rightarrow c = \frac{6}{a}$
$24 = ca^{3} \Rightarrow 24 = \frac{6}{a}a^{3}$ $\Rightarrow$ $24 = 6a^{2}$
$4 = a^{2}$ $a = \pm 2$

$c=3$ $\therefore$ $\boxed{f(x) = 3(2)^{x}}$

(22) $3 = Ca^{-1}$ $\Rightarrow \begin{cases} 3 = \frac{4}{3a}\frac{1}{a} = \\ 3 = \frac{4}{3a^2} \Rightarrow a^2 = \frac{4}{9} \quad a = \pm 2/3 \end{cases}$

$\frac{4}{3} = Ca^1 \Rightarrow C = \frac{4}{3a}$

$3 = C\frac{3}{2} \Rightarrow C = 2$

$\boxed{\therefore f(x) = 2(2/3)^x}$

(23) $\frac{5^{x+h} - 5^x}{h} = \frac{5^x 5^h - 5^x}{h} = \frac{5^x(5^h - 1)}{h}$

(24) Lets assume it is the shortest month, February. Then $n = 28$ or 29. We will use 29. Then $2^{n-1} = 2^{28-1} = 2^{27} = 134{,}217{,}728$ cents or \$ 1,342,177.28. Therefore option II is best.

(29) a) $100(2)^{15/3} = 3200$ bacteria

b) $100\,2^{t/3} = f(t)$

c) $100(2^{100/3}) \approx 10{,}159$ bactria

d) $t \approx 26.9$ hours.

(30) a) $500(2)^{3(2)} = 32{,}000$ bacteria

b) $f(t) = 500(2)^{2t}$

c) $f(2/3) = 500(2)^{2 \cdot 2/3} = 500(2)^{4/3} = 1260$ bacteria

d) $t \approx 3.82$ hrs.

(31) a) $200(\frac{1}{2})^{15/5} = 25$ mg

b) $f(t) = 200(\frac{1}{2})^{t/5}$

c) $200(\frac{1}{2})^{21/5} \approx 10.9$ mg

d) $d \approx 38.2$ days