CHAPTER 3 REVIEW

FORMULAS

$y = mx + b$ $\qquad m = \frac{y_2 - y_1}{x_2 - x_1}$

$Ax + By = C$ $\qquad m = -\frac{A}{B}$

$y - y_1 = m(x - x_1)$

AVG. RATE OF $\Delta = \frac{f(b) - f(a)}{b - a}$

! KNOW THESE !

$y = a \cdot b^x$ $\qquad y = a(1+r)^t$

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

$y = a(1-r)^t$

$a_n = a_1 + (n-1)d$ ARITHMETIC

$a_n = a_1 r^{n-1}$ GEOMETRIC

SEC. 3.1 PROPERTIES OF EXPONENTS

SIMPLIFY

① $(2xy^2)^2 = 4x^2y^4$ ② $3(w^3)^5 = 3w^{15}$

③ $(3x^{-2}y^3)^{-2} = \frac{x^4}{9y^6}$ ④ $\left(\frac{3x^2yz}{2xy}\right)^0 = 1$

⑤ $\left(\frac{3x^{-2}y}{6xy^{-2}z}\right)^2 = \frac{y^6}{4x^6z^2}$ ⑥ $\left(\frac{x^2}{y^2}\right)^2 = \frac{x^4}{y^4}$

⑦ $(4a^3b^2)(3a^{-4}b^{-3}) = \frac{12}{ab}$ ⑧ $(4xy^2)^{-1} = \frac{1}{4xy^2}$

⑨ $\frac{3x^3y^{-1}z^{-1}}{x^{-4}y^0z^0} = \frac{3x^7}{yz}$ ⑩ $\frac{r^2}{3r^3} = \frac{1}{3r}$

SEC. 3.2 SIMPLIFYING RADICALS

(1) $3\sqrt{5} \cdot \sqrt{2} = 3\sqrt{10}$

(2) $2\sqrt{10} \cdot 5\sqrt{5} = 50\sqrt{2}$

(3) $\sqrt{64x^2y^3} = 8xy\sqrt{y}$

(4) $\sqrt{147} = 7\sqrt{3}$

(5) $3\sqrt{5} + 2\sqrt{5} = 5\sqrt{5}$

(6) $6\sqrt{18} - 4\sqrt{32} =$
$18\sqrt{2} - 16\sqrt{2} = 2\sqrt{2}$

(7) $3\sqrt{45} + 4\sqrt{80} - 2\sqrt{125} =$
$9\sqrt{5} + 16\sqrt{5} - 10\sqrt{5} = 25\sqrt{5} - 10\sqrt{5} = 15\sqrt{5}$

(8) $\frac{2\sqrt{7}}{\sqrt{5}} = \frac{2\sqrt{35}}{5}$

(9) $\frac{\sqrt{11}}{\sqrt{6}} = \frac{\sqrt{66}}{6}$

(10) $6\sqrt{7} - 3\sqrt{7} = 3\sqrt{7}$

(11) $\sqrt{200m^4n} = 10m^2\sqrt{2n}$

(12) $\sqrt{28x^3y^3} = 2xy\sqrt{7xy}$

(13) $3\sqrt{3}(3\sqrt{2} + 5) = 9\sqrt{6} + 15\sqrt{3}$

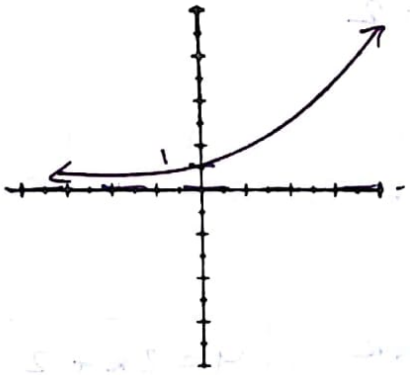
(14) $(-4\sqrt{28x})(\sqrt{7x^3}) = -4\sqrt{28 \cdot 7x^4} = (-4)(2)(7)x^2$
$28 = 2 \cdot 14 = 2 \cdot 2 \cdot 7$
$= -56x^2$

(15) $\sqrt{300} = 10\sqrt{3}$

SEC 3.3 EXPONENTIAL FUNCTIONS

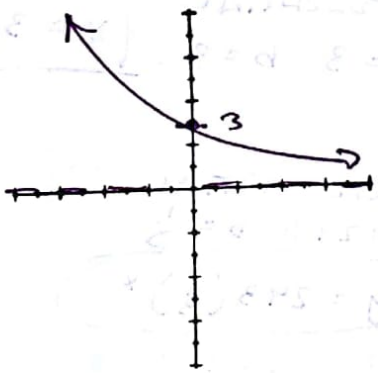
GRAPH EACH OF THE FOLLOWING FUNCTIONS. GIVE Y-INTERCEPT, EQUATION OF HORIZONTAL ASYMPTOTE, DOMAIN, RANGE, AND END BEHAVIOR.

(1) $f(x) = 2^x$



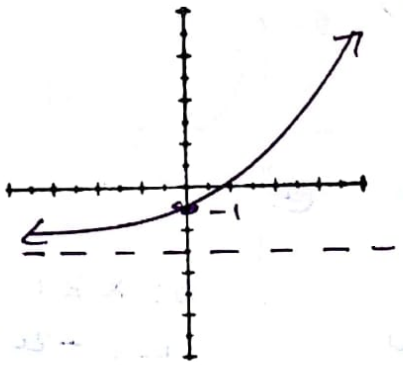
Y-INT $(0, 1)$
HA: $y = 0$
D: $\mathbb{R}$
R: $y > 0$
AS $x \to \infty$, $f(x) \to \infty$
AS $x \to -\infty$, $f(x) \to 0$

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



Y-INT $(0, 3)$
HA: $y = 0$
D: $\mathbb{R}$
R: $y > 0$
AS $x \to \infty$, $g(x) \to 0$
AS $x \to -\infty$, $g(x) \to \infty$

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



Y-INT $(0, -1)$
HA: $y = -3$
D: $\mathbb{R}$
R: $y > -3$
AS $x \to \infty$, $h(x) \to \infty$
AS $x \to -\infty$, $h(x) \to -3$

(4) GIVE THE EQUATION OF THE HORIZONTAL ASYMPTOTE FOR THE GRAPHS OF EACH OF THE FOLLOWING FUNCTIONS.

(A) $f(x) = 2(3.1)^x$ $\quad y = 0$

(B) $g(x) = 1.5(2)^x - 1$ $\quad y = -1$

(C) $h(x) = -3\left(\frac{1}{2}\right)^x + 2$ $\quad y = 2$

(5) FOR EACH FUNCTION, INDICATE WHETHER IT IS LINEAR OR EXPONENTIAL AND GIVE THE EQUATION OF THE FUNCTION.

(A)

x	3	4	5	6
f(x)	8	10	12	14

0 1 2 — 2 4 6 — +2 +2 +2

LINEAR $m = \frac{2}{1} = 2$ $b = 2$

$y = 2x + 2$

(B)

x	0	1	2	3
g(x)	3	9	27	54

×3 ×3 ×3

EXPONENTIAL $a = 3$ $b = 3$

$y = 3(3)^x$

(C)

x	2	3	4	5
h(x)	27	9	3	1

0 1 — 243 81 — ×1/3 ×1/3 ×1/3

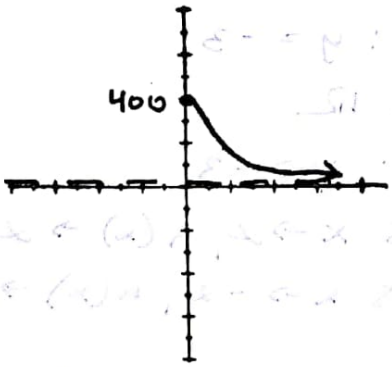
EXPONENTIAL $a = 243$ $b = \frac{1}{3}$

$y = 243\left(\frac{1}{3}\right)^x$

2 27 / 3 / 81 / ×3 / 243

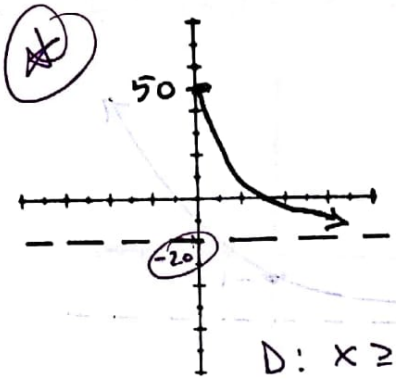
(6) GIVE DOMAIN + RANGE FOR THE FUNCTIONS GRAPHED BELOW:

(A)



D: $x \geq 0$ R: $0 < y \leq 400$

(B)



D: $x \geq 0$

R: $-20 < y \leq 50$

EC 3.4 GROWTH & DECAY

(1) JOSEPH INVESTED $300 IN AN ACCOUNT THAT GIVES 5.5% INTEREST COMPOUNDED QUARTERLY. HOW MUCH WILL HIS INVESTMENT BE WORTH IN 5 YEARS. SHOW SET-UP.

$$A = 300\left(1+\frac{0.055}{4}\right)^{4\cdot 5} \approx \boxed{\$394.22}$$

(2) SUPPOSE A $32,000 CAR DEPRECIATES AT A RATE OF 4% PER YEAR. WHAT WILL BE THE CAR'S VALUE IN 10 YEARS? SHOW SET-UP.

$$y = 32{,}000(1-0.04)^{10} \approx \boxed{\$21{,}274.64}$$

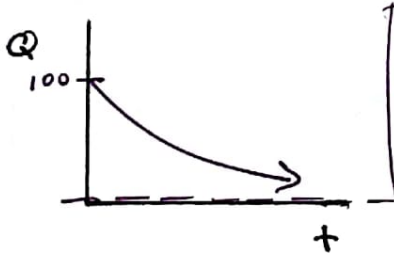
(3) THE FOLLOWING FUNCTION SHOWS HOW A RADIOACTIVE ISOTOPE DECAYS AS A FUNCTION OF t YEARS.

$$Q = 100(.98)^t$$

HOW MUCH (%) OF THE ISOTOPE IS LOST EACH YEAR? 2%

$1-0.98 = 0.02 \Rightarrow 2\%$

(4) SKETCH A GRAPH OF THE FUNCTION IN QUESTION (3) ABOVE. STATE THE DOMAIN & RANGE.



D: $t \geq 0$

R: $0 < Q \leq 100$

(5) THE POPULATION OF HYENAS IN NC WAS 2152 IN 2000. ASSUMING THE POPULATION IS GROWING AT AN ANNUAL RATE OF 1% PER YEAR, WHEN WILL THE POPULATION REACH 2200.

$$y = 2152(1+0.01)^t \qquad 2200 = 2152(1+0.01)^t$$

$2 \to 2195 \qquad 3 \to 2217$ $\boxed{2002}$

SEC 3.5 GEOMETRIC SEQUENCES

(1) STATE WHETHER EACH SEQUENCE IS ARITHMETIC, GEOMETRIC, OR NEITHER

(A) 5, 10, 15, 20, 25, ... ARITH. $d = 5$

(B) 7, −14, 28, −56, ... GEOM $r = -2$

(C) 16, 24, 36, 54, ... GEOM $r = 1.5$

(2) FIND THE NEXT 3 TERMS OF EACH SEQUENCE.

(A) 1, 6, 36, ... $r = 6$ 216, 1296, 7776

(B) 28, 30, 32, ... $d = 2$ 34, 36, 38

(C) $\frac{1}{4}, \frac{1}{16}, \frac{1}{64}, \ldots$ $r = \frac{1}{4}$ $\frac{1}{256}, \frac{1}{1024}, \frac{1}{4096}$

(D) 0.05, 0.5, 5, 50, ... $r = 10$ 500, 5000, 50,000

(3) WRITE A FORMULA FOR a_n, THE nth TERM, OF EACH SEQUENCE IN QUESTION (2) ABOVE.

(A) $a_n = 1(6)^{n-1}$

(B) $a_n = 28 + (n-1)(2)$

(C) $a_n = \frac{1}{4}\left(\frac{1}{4}\right)^{n-1}$

(D) $a_n = 0.05(10)^{n-1}$

(4) FIND THE 10th TERM, a_{10}, OF EACH SEQUENCE IN QUESTION (2) ABOVE. SHOW SET-UP.

(A) $a_{10} = 1(6)^9 = 10{,}077{,}696$

(B) $a_{10} = 28 + (9)(2) = 46$

(C) $a_{10} = \frac{1}{4}\left(\frac{1}{4}\right)^9 = \frac{1}{1048576}$ (9.5×10^{-7})

(D) $a_{10} = 0.05(10)^9 = 50{,}000{,}000$