REVIEW

MA40 F2017

① SIMPLIFY:

(A) $\dfrac{34x^2y^{-2}z^2}{17x^{-5}yz} = \dfrac{2x^7z}{y^3}$

(B) $(2x^4y^{-3})^{-2} = 2^{-2}x^{-8}y^6 = \dfrac{y^6}{4x^8}$

(C) $\dfrac{3x^3y^{-1}z^{-1}}{x^{-4}y^0z^0} = \dfrac{3x^7}{yz}$

② SIMPLIFY:

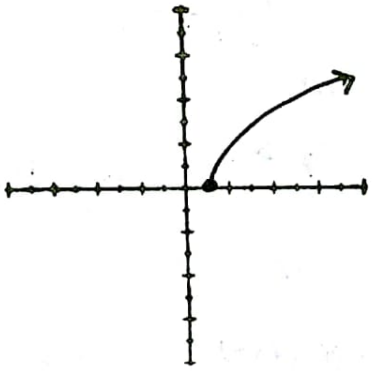
(A) $\sqrt{147m^3n^4}$ $\quad 147 = 3 \cdot 49 = 3 \cdot 7 \cdot 7$ $\quad 7mn^2\sqrt{3m}$

(B) $-\sqrt{12} + 7\sqrt{3} + \sqrt{75} = -2\sqrt{3} + 7\sqrt{3} + 5\sqrt{3} = 10\sqrt{3}$

(C) $\sqrt{10x^2}\sqrt{5x^3} = \sqrt{50x^5} = 5x^2\sqrt{2x}$

(D) $-3\sqrt{3}(2+\sqrt{6}) = -6\sqrt{3} - 3\sqrt{18} = -6\sqrt{3} - 9\sqrt{2}$

③ GIVE DOMAIN & RANGE FOR f(x) GRAPHED BELOW:



D: $x \geq 1$

R: $y \geq 0$

CONTINUED →

(4) FIND THE AVERAGE RATE OF CHANGE OF $f(x) = 3x^2 + 1$ ON THE INTERVAL FROM $x = 1$ TO $x = 3$.

$f(3) = 3(3)^2 + 1 = 28$
$f(1) = 3(1)^2 + 1 = 4$

$\frac{28-4}{3-1} = \frac{24}{2} = 12$

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* EXPONENTIAL FUNCTIONS *

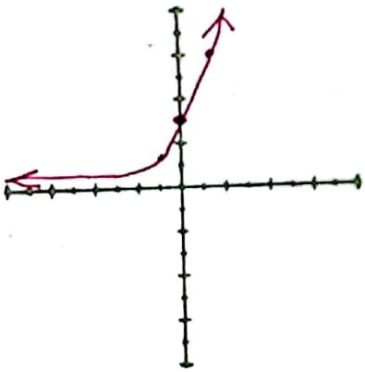
AN EXPONENTIAL FUNCTION HAS A VARIABLE AS ITS EXPONENT. THE GENERAL FORM OF AN EXPONENTIAL FUNCTION IS:

$$y = a \cdot b^x$$ WHERE $b > 0$ AND $b \neq 1$.

WHERE a IS THE INITIAL VALUE (Y-INTERCEPT) AND b IS THE GROWTH RATE/DECAY RATE (BASE)

(ex) $y = 3 \cdot 2^x$

x	y
-1	3/2
0	3
1	6
2	12

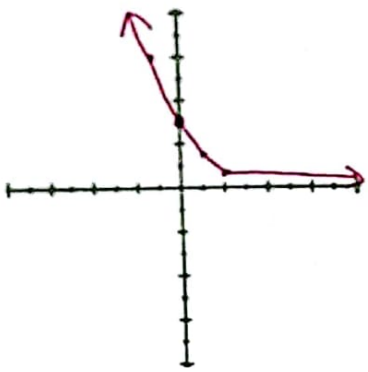


"GROWTH"

Y-INT: (0, 3)
D: $\mathbb{R}$
R: $y > 0$

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

Y	y
-1	6
0	3
1	3/2
2	3/4



Y-INT: (0, 3)
D: $\mathbb{R}$
R: $y > 0$

DISCUSS

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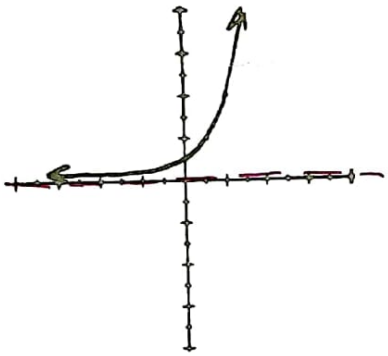
* WHEN $b > 1$, EXPONENTIAL GROWTH

* WHEN $0 < b < 1$, EXPONENTIAL DECAY

X-INTERCEPT: THE POINT $(a, 0)$ WHERE THE GRAPH CROSSES THE X-AXIS. (NOTE: THERE MAY NOT BE ONE.)

Y-INTERCEPT: THE POINT $(0, b)$ WHERE THE GRAPH CROSSES THE Y-AXIS. ALSO THE INITIAL VALUE.

(ex) THE GRAPH AND TABLE FOR $f(x) = 2^x$ ARE SHOWN BELOW:



x	$f(x)$
-2	$\frac{1}{4}$
-1	$\frac{1}{2}$
0	1
2	4
1	2

WHAT IS THE X-INTERCEPT? NONE

WHAT IS THE Y-INTERCEPT? $(0, 1)$

END BEHAVIOR - FUNCTIONS CAN ALSO BE DESCRIBED IN TERMS OF THEIR END BEHAVIOR. IN OTHER WORDS, WHAT HAPPENS WHEN: (A) WE LOOK AT LARGER + LARGER VALUES OF X, AND (B) WE LOOK AT SMALLER + SMALLER VALUES OF X.

(ex) DESCRIBE THE END BEHAVIOR OF $f(x) = 2^x$.

AS $x \to \infty$, $f(x) \to \infty$

AS $x \to -\infty$, $f(x) \to 0$

ASYMPTOTES - THE LINE THAT THE FUNCTION APPROACHES BUT NEVER TOUCHES IS CALLED A HORIZONTAL ASYMPTOTE.

(ex) WHAT IS THE HORIZONTAL ASYMPTOTE FOR $f(x) = 2^x$?

$\boxed{y = 0}$ GRAPH.

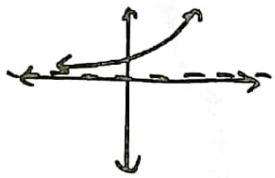
DOMAIN: THE SET OF ALL X-VALUES THAT "MAKE SENSE" FOR THE FUNCTION.

RANGE: THE SET OF ALL Y-VALUES THAT ARE "OUTPUTS" FOR THE FUNCTION.

(9) WHAT ARE THE DOMAIN + RANGE FOR $f(x) = 2^x$?

D: $\mathbb{R}$

R: $y > 0$



MAXIMUM: THE LARGEST Y-VALUE THAT A FUNCTION CAN ATTAIN.

MINIMUM: SMALLEST Y-VALUE THAT A FUNCTION CAN ATTAIN.

(10) WHAT IS THE MAXIMUM OF $f(x) = 2^x$? NONE.

WHAT IS THE MINIMUM OF $f(x) = 2^x$? NONE.

APPLICATION GIVEN THE FUNCTION $g(x) = 3^x$.

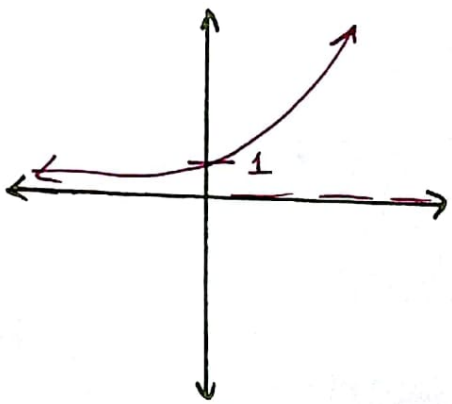
$3^{-3} = \frac{1}{27}$

$3^{-2} = \frac{1}{9}$

(A) COMPLETE THE TABLE. DO NOT USE DECIMALS.

x	-3	-2	-1	0	1	2
$g(x)$	$\frac{1}{27}$	$\frac{1}{9}$	$\frac{1}{3}$	1	3	9

(B) SKETCH THE GRAPH. LABEL APPROPRIATE POINTS.



(C) DESCRIBE END BEHAVIOR.

AS $x \to \infty$, $g(x) \to \infty$

AS $x \to -\infty$, $g(x) \to 0$

(D) GIVE Y-INTERCEPT.

$(0, 1)$

(E) GIVE EQUATION OF HORIZONTAL ASYMPTOTE.

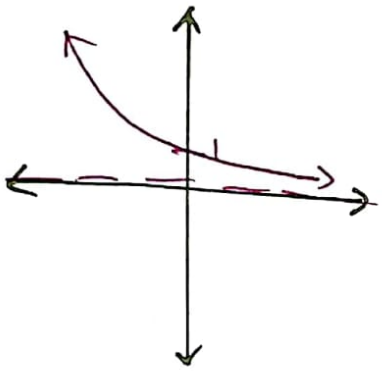
$y = 0$

(F) DOMAIN: $\mathbb{R}$

RANGE: $y > 0$

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

Ⓐ SKETCH THE GRAPH OF $g(x)$. LABEL SIGNIFICANT POINTS.



Ⓑ DESCRIBE END BEHAVIOR.

AS $x \to \infty$, $g(x) \to 0$

AS $x \to -\infty$, $g(x) \to \infty$

Ⓒ GIVE Y-INTERCEPT.

$(0, 1)$

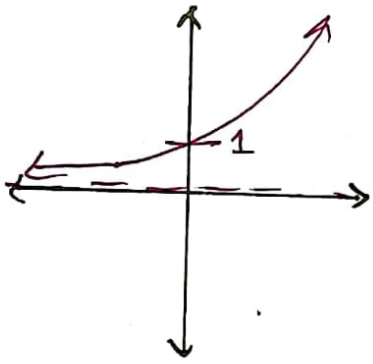
Ⓓ GIVE EQUATION OF HORIZONTAL ASYMPTOTE. $y = 0$

Ⓔ DOMAIN: $\mathbb{R}$

RANGE: $y > 0$

② GIVEN $h(x) = (2.15)^x$,

Ⓐ SKETCH THE GRAPH OF $h(x)$. LABEL SIGNIFICANT POINTS.



Ⓑ DESCRIBE END BEHAVIOR.

AS $x \to \infty$, $h(x) \to \infty$

AS $x \to -\infty$, $h(x) \to 0$

Ⓒ GIVE Y-INTERCEPT.

$(0, 1)$

Ⓓ GIVE EQUATION OF HORIZONTAL ASYMPTOTE. $y = 0$

Ⓔ DOMAIN: $\mathbb{R}$

RANGE: $y > 0$