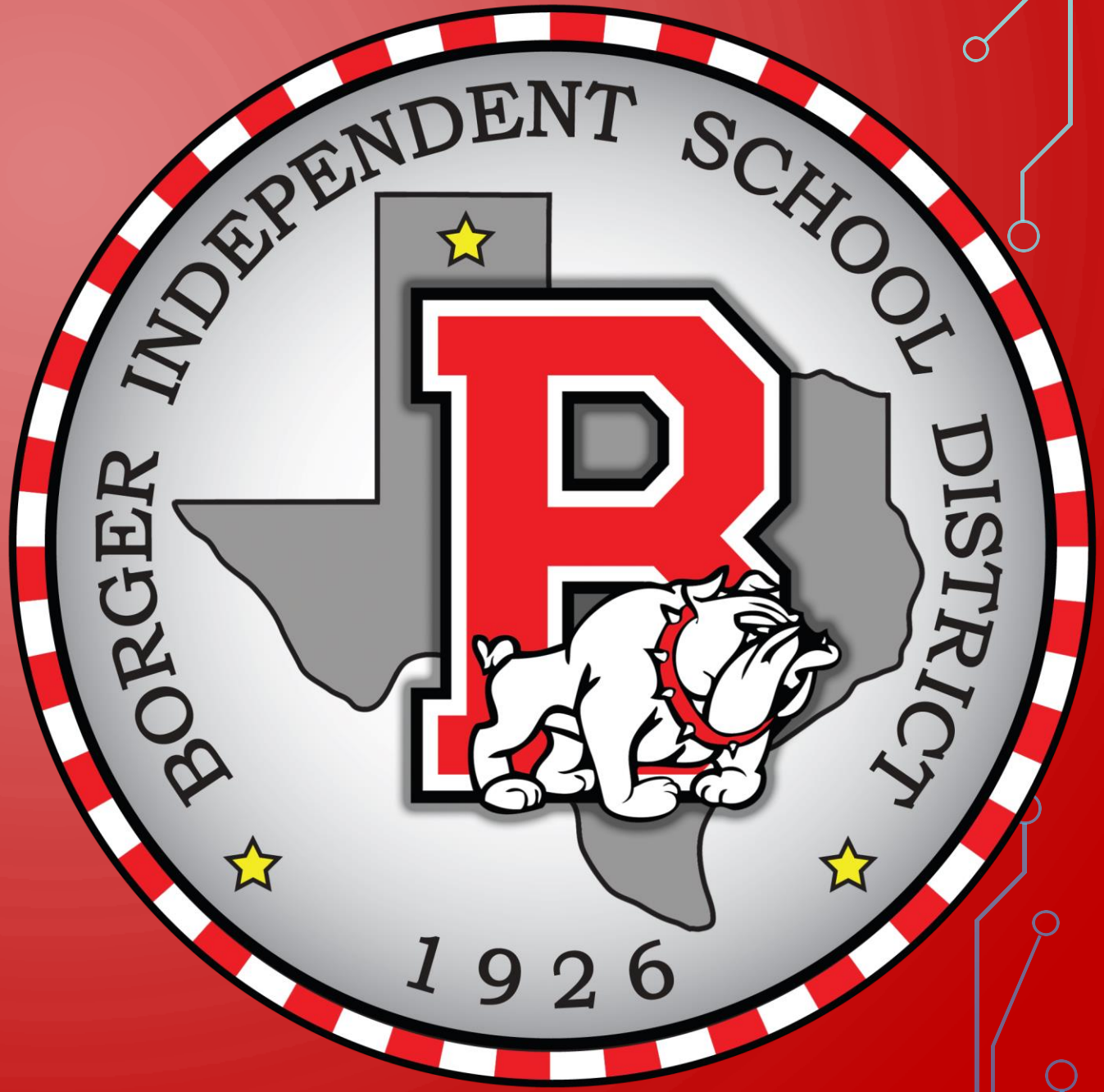
BOARD NOTES

24 OCTOBER 2018



CC ALGEBRA
CHAPTER 4 – EXPONENTIAL AND LOGARITHMIC FUNCTIONS

- SECTION 4.1 - EXPONENTIAL FUNCTIONS

Objectives:

- Evaluate exponential functions
- Graph exponential functions
- Evaluate functions with base e
- Use compound interest formula

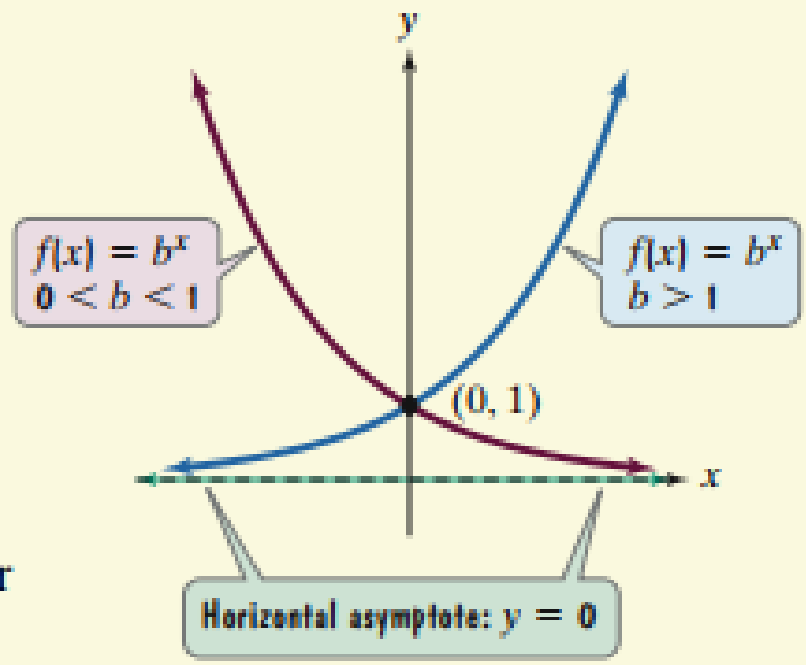
Definition of the Exponential Function

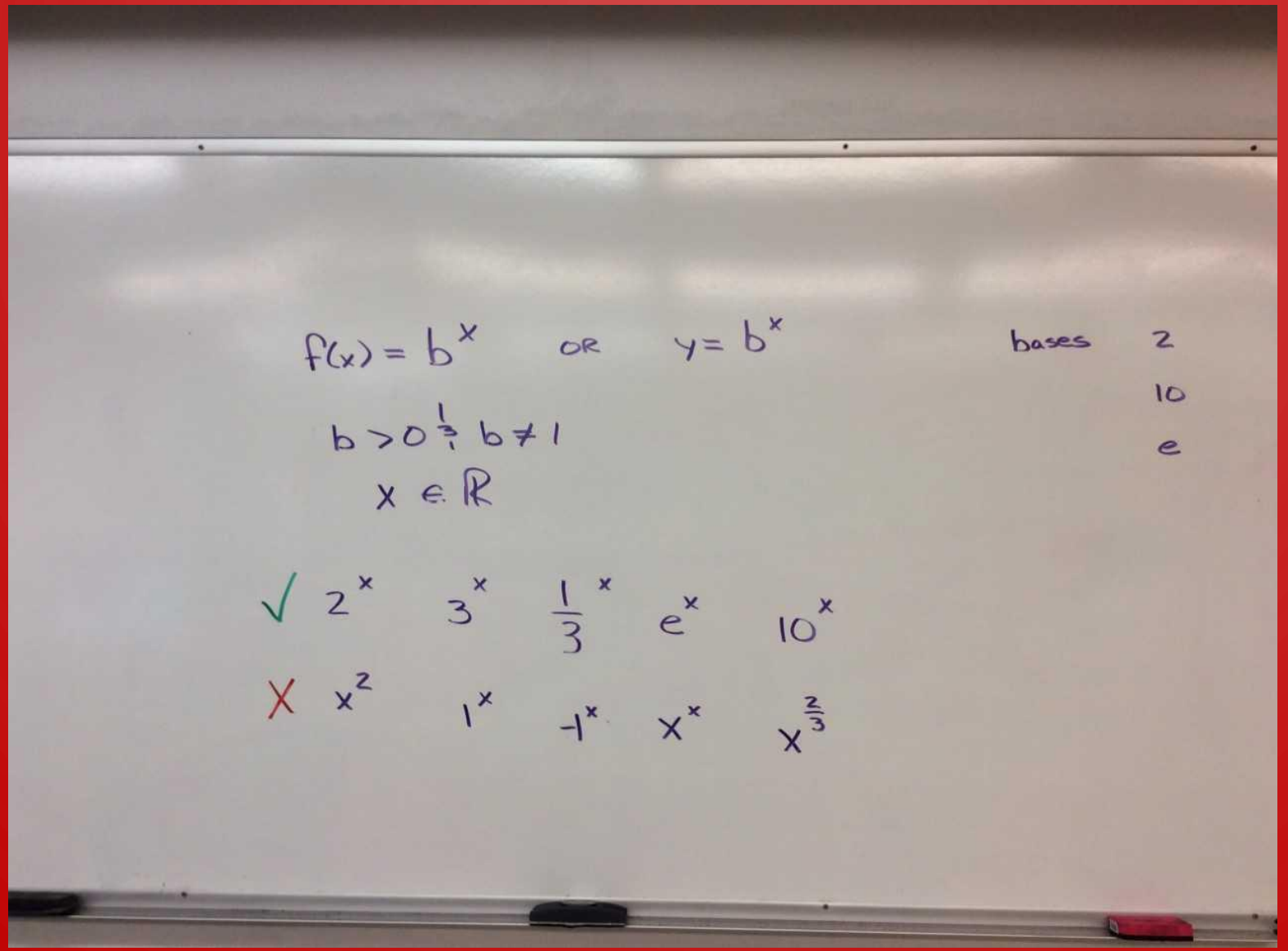
The **exponential function** f **with base** b is defined by

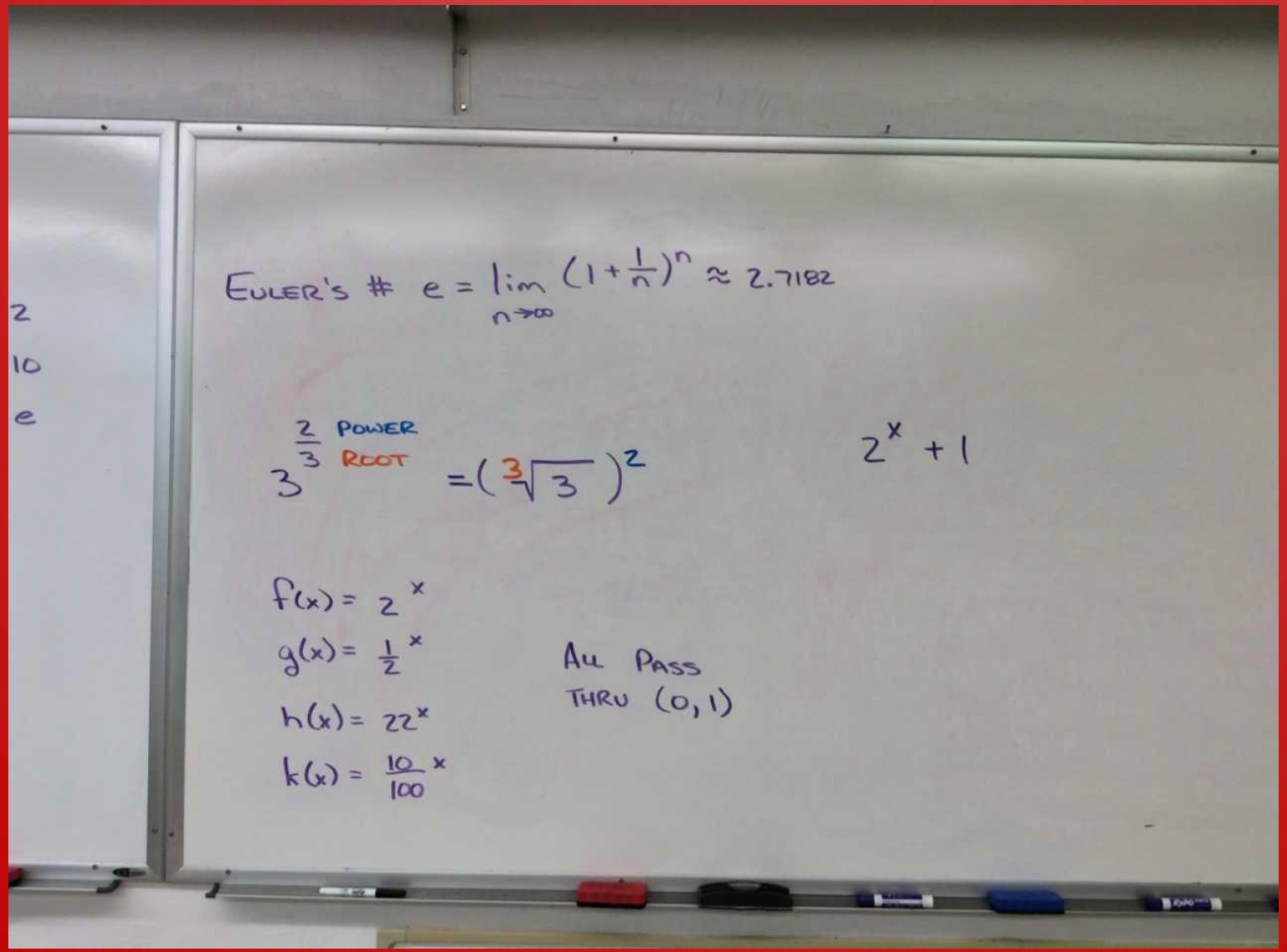
$$f(x) = b^x \quad \text{or} \quad y = b^x,$$

where b is a positive constant other than 1 ($b > 0$ and $b \neq 1$) and x is any real number.

1. The domain of $f(x) = b^x$ consists of all real numbers: $(-\infty, \infty)$. The range of $f(x) = b^x$ consists of all positive real numbers: $(0, \infty)$.
2. The graphs of all exponential functions of the form $f(x) = b^x$ pass through the point $(0, 1)$ because $f(0) = b^0 = 1 (b \neq 0)$. The y-intercept is 1. There is no x-intercept.
3. If $b > 1$, $f(x) = b^x$ has a graph that goes up to the right and is an increasing function. The greater the value of b, the steeper the increase.
4. If $0 < b < 1$, $f(x) = b^x$ has a graph that goes down to the right and is a decreasing function. The smaller the value of b, the steeper the decrease.
5. $f(x) = b^x$ is one-to-one and has an inverse that is a function.
6. The graph of $f(x) = b^x$ approaches, but does not touch, the x-axis. The x-axis, or $y = 0$, is a horizontal asymptote.




f(x) = b^x OR y = b^x
b > 0, b ≠ 1
x ∈ ℝ
bases 2
10
e
✓ 2^x 3^x (1/3)^x e^x 10^x
X x^2 1^x (-1)^x x^x x^(2/3)


Euler's # $e = \lim_{n\to\infty}(1+\frac{1}{n})^n \approx 2.7182$
$3^{\frac{2}{3}}$ POWER ROOT $= (\sqrt[3]{3})^2$
$2^x + 1$
$f(x) = 2^x$
$g(x) = \frac{1}{2}^x$
$h(x) = 22^x$
$k(x) = \frac{10}{100}^x$
All Pass Thru (0, 1)