

4.5 - Exploring the Properties of Exponential Functions

- GOAL – Determine the characteristics of the graphs and equations of exponential functions.
- A lot of phenomenon in real life can be modelled by exponential growth.
 - **EX.: Population Growth**
 - **EX.: Cooling of a Liquid**
(http://www.youtube.com/watch?v=wV7g8L633Sg&src_vid=gjsMV1MglA4&feature=iv&annotation_id=annotation_71719)
 - **EX.: Peregrine Falcon – exponential?**
 - <http://www.youtube.com/watch?v=r7lglchYNew>

So What's the Difference?

- Is there a difference between quadratic and exponential functions?
- **Are quadratic functions exponential?**
- **Nope, they're very different.**
- **QUADRATIC – power of 2. E.g. $y = x^2$, $y = 3(x - 1)^2 + 7$**
- **EXPONENTIAL – power of x. E.g. $y = 3^x$, $x = 1, 2, 3, \dots$**
- **Second differences are not constant.**



In Summary...

- The exponential function has the form $y = b^x$.
- If $b > 0$, the function has domain $\{ x \in \mathbb{R} \}$ and range is $\{ y \geq 0 \mid y \in \mathbb{R} \}$
- If $b > 1$, then the larger the value of b , the faster the *growth*
- If $0 < b < 1$, then the smaller the b , the faster the *decay*
- Exponential functions have the x-axis ($y = 0$) as a *horizontal asymptote*
- **All exponential functions have a y-intercept of 1.**