

1. Consider the function  $f(x) = ac^x$ .
- a) What is the domain of  $f$ ?  $\mathbb{R}$
- b) What is the range of  $f$  when  
 1.  $a > 0$ ?  $\mathbb{R}_+$       2.  $a < 0$ ?  $\mathbb{R}_-$
- c) Does the function  $f$  have a zero? **No**
- d) Does the function  $f$  have an asymptote? If yes, what is the equation of the asymptote?  
**Yes, the  $x$ -axis with equation  $y = 0$ .**
- e) Indicate if the function is increasing or decreasing when  
 1.  $a > 0$  and  $c > 1$ . **increasing**      2.  $a > 0$  and  $0 < c < 1$ . **decreasing**  
 3.  $a < 0$  and  $c > 1$ . **decreasing**      4.  $a < 0$  and  $0 < c < 1$ . **increasing**
2. For each of the following functions, indicate if  
 1. the function is positive or negative.  
 2. the function is increasing or decreasing.
- a)  $y = -3\left(\frac{1}{4}\right)^x$       b)  $y = 2\left(\frac{3}{2}\right)^x$       c)  $y = -\frac{1}{4}(2)^x$       d)  $y = 10\left(\frac{1}{2}\right)^x$
1. **Negative**      1. **Positive**      1. **Negative**      1. **Positive**  
 2. **Increasing**      2. **Increasing**      2. **Decreasing**      2. **Decreasing**

- e)  $y = 2(3)^{-x}$       f)  $y = -2(5)^{-x}$       g)  $y = \left(\frac{1}{3}\right)^{-x}$       h)  $y = -\left(\frac{3}{2}\right)^{-x}$
1. **Positive**      1. **Negative**      1. **Positive**      1. **Negative**  
 2. **Decreasing**      2. **Increasing**      2. **Increasing**      2. **Increasing**
3. Julie invests an amount of \$1000 in a bank at an interest rate of 8% compounded annually. The capital,  $C(t)$ , accumulated after  $t$  months, is given by  $C(t) = 1000(1.08)^t$ . What is the accumulated capital after  
 a) 3 years? **\$1259.71**      b) 5 years? **\$1469.33**
4. A radioactive substance disintegrates over time. Its mass  $m$  (in grams) is expressed as a function of time  $t$  (in years) by the equation  $m = 10(0.8)^t$ . What is the mass of this substance  
 a) today ( $t = 0$ )? **10 g**      b) in 2 years? **6.4 g**      c) one year ago? **12.5 g**
5. The value  $v(t)$  of a car that depreciates by 20% per year is given by  $v(t) = v_0(0.80)^t$  where  $v_0$  represents the initial value of the car and  $t$  represents the number of years since its purchase.  
 a) What is the value of a new car 3 years after its purchase if it was bought for \$30 000?  
**\$15 360**  
 b) How much did you pay for a car now worth \$22 400 two years after its purchase? **\$35 000**