6.3 Notes continued

4) Find a general solution to $yy' = 6\cos(\pi x)$. Then find the particular solution, y = f(x), if the function passes through the point (1, 2).

$$yy' = 6\cos(\pi x)$$

$$y(\frac{dy}{dx}) = 6\cos(\pi x)$$

$$ydy = 6\cos(\pi x)$$

$$ydy = 6\cos(\pi x)dx$$

$$y^2 = 6\sin(\pi x)dx$$

$$y^2 = 6\cos(\pi x)dx$$

$$y^2 = 6$$

$$\frac{1}{2} = \frac{6}{\pi} \sin(\pi x) + C$$

$$y^{2} = \frac{12}{\pi} \sin(\pi x) + C$$

$$use (1,2)$$

$$use (1,2)$$

$$\frac{1}{2} = \frac{1}{\pi} \sin(\pi x) + C$$

$$\frac{1}{2}$$

5) General equation for
$$y'=(x+i)y$$

$$\frac{dy}{dx} = \frac{(x+i)y}{1}$$

$$\frac{dy}{dx} = \frac{(x+i)y}{1}$$

$$\frac{dy}{dx} = \frac{(x+i)y}{2} = \frac{x^2}{2} + x + c$$

$$\frac{dy}{dy} = \frac{x^2}{2} + x + c$$

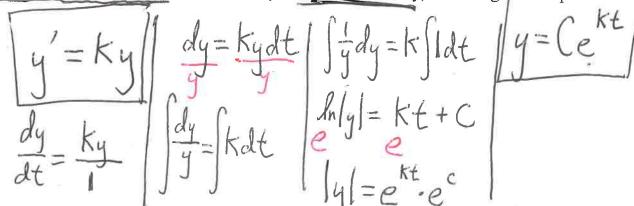
Calculus AB

Chapter 6.2 Notes: Solving Differential Equation Word Problems

- 1. Direct proportion equation: $U = K \times$
- 2. Inverse (indirect) proportion equation:
- 3. k is called the Constant of proportionality

Exponential Growth/Decay class examples

If the rate of change of y varies directly with the value of y, find the general equation: 1)



The rate of increase of the population of a certain city is proportional to the population. If the population in 1930 was 50,000 and in 1960 it was 75,000, what was the expected

population in 1990?

$$P'=KP$$
 Ce^{k+1}
 Ce^{k+1}
 Ce^{k+2}
 Ce^{k+3}
 Ce^{k+4}
 Ce^{k+4}

$$50,000 = C$$
 (60, __)

$$75,000 = 50,000e$$
 $16.5 = 16^{30k}$
 $16.5 = 30k$
 $16.5 = 30k$

3) The rate of decay of radium is proportional to the amount present at any time. If 60 mg of radium are present now and its half-life is 1690 years, how much radium will be present 100

years from now?	(time, radium)	let now be t=0
r=Cekt	(t, r)	
60=Cek(0).	(0,60)	1690 = K
60 = C	(1690, 30)	$r = 60e^{\frac{\ln 0.5}{1690}} t$
r=60e kt	(100,)	(205)/ 1
30-60e K(1690)	120.5 = he 1690k	
60 60	In 0.5 = 1690K Pr	r= 57.589mg
	I	

4. In a certain culture where the rate of growth of bacteria is proportional to the amount present, the number triples in 3 hours.

A) If at the end of 12 hours there were 10 million bacteria, how many were present initially?

B) Find the specific exponential growth equation

<u>Note for homework</u>: Newton's law of cooling: the rate of change in the temperature of an object is proportional to the difference between the object's temperature and the temperature of the surrounding medium