Math 162
Quiz 4

Show all work in a neat and organized fashion. Clearly indicate your answers.
10 points possible.

Label all numeric answers. With models, give a concise explanation of the variables.

Example: Suppose a problem asks for a model, and suppose this is the answer:

$$Tax = 2538.90 + 540.37t \text{ dollars, where } t \text{ is the number of years since 1989.}$$

To receive full credit, this answer must include **all** of the following:
(1) the correct model (i.e., $Tax = 2538.90 + 540.37t$),
(2) the correct label for the output (i.e., "dollars"), and
(3) the correct explanation of the input variable (i.e., "where t is the number of years since 1989").

Example: Here is another correct way to write the same answer.

$D = 2538.90 + 540.37x$, where D = dollars of tax, and x = number of years since 1989.

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1. (5 pts.) Based on data from the U.S. Bureau of the Census, the population of the world was 3 billion in 1960, 4 billion in 1974, 5 billion in 1987, and 6 billion in 1999.

(See `http://www.census.gov/ipc/www/worldpop.html`)

(a) Find an exponential model for the world population. Do not round.

(b) Use the model to predict the world population in 2005.

(c) According to the model, what is the constant yearly percentage change?

2. (5 pts.) At the end of World War I, in the fall of 1918, an influenza epidemic hit the United States Navy. It spread to the Army, to American civilians, and ultimately to the world. It is estimated that by 1920, twenty million people had died from the epidemic. Five hundred fifty thousand of these were Americans—over ten times the number of WWI battle deaths. The tables below give the total numbers of Navy, Army, and civilian deaths due to the epidemic (based on data from A. W. Crosby, Jr., *Epidemic and Peace 1918*, Westport, Connecticut: Greenwood Press, 1976).

	Total Deaths		Total Civilian Deaths
Week ending	Navy	Army	in 45 Major Cities
August 31	2		
September 7	13	40	
September 14	56	76	68
September 21	292	174	517
September 28	1172	1146	1970
October 5	1823	3590	6528
October 12	2338	9760	17,914
October 19	2670	15,319	37,853
October 26	2820	17,943	58,659
November 2	2919	19,126	73,477
November 9	2990	20,034	81,919
November 16	3047	20,553	86,957
November 23	3104	20,867	90,449
November 30	3137	21,184	93,641

(a) Find a logistic model to fit the set data for *civilian* deaths. Do not round.

(b) According to the *model*, what is the limiting value for civilian deaths?