

**Math 131 Week in Review**  
**Sections 1.1-1.3, 1.5-1.6, 2.1-2.5**  
**2/14/2010**

1. A cell phone company has a base charge of \$20 per month. The first 200 minutes are free, and the next 400 minutes cost \$0.15 per minute. Usage over 600 minutes costs \$0.25 per minute. Find a function,  $C(t)$ , the amount of a cell phone bill for the month in which a customer uses  $t$  cell phone minutes.

2. Find the domain of  $f(x) = \frac{3^{x-2}}{\ln \sqrt{x^2 - 4}}$ .

3. The per capita consumption of potato chips in a small community increased in the past five years as shown in the table below.

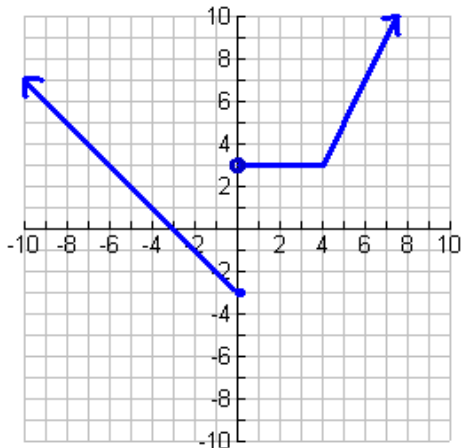
Year	2004	2005	2006	2007	2008
mg per person per year	2.1	2.4	2.6	2.9	3.2

Find a linear model through regression on the calculator.

- a) Give the slope and interpret it in the context of the problem.

- b) If the trend continues, how many mg of potato will be expected per capita in 2011 (use the unrounded equation)?

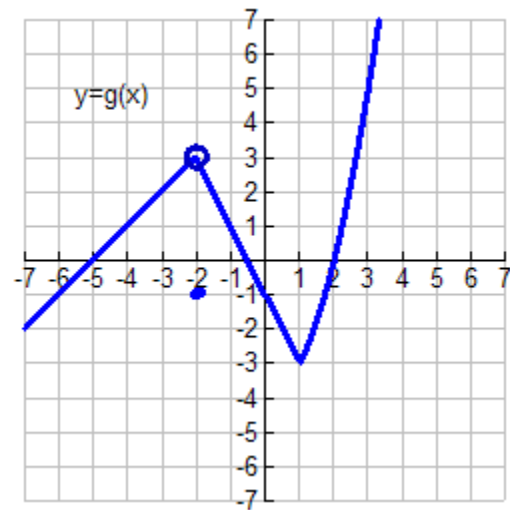
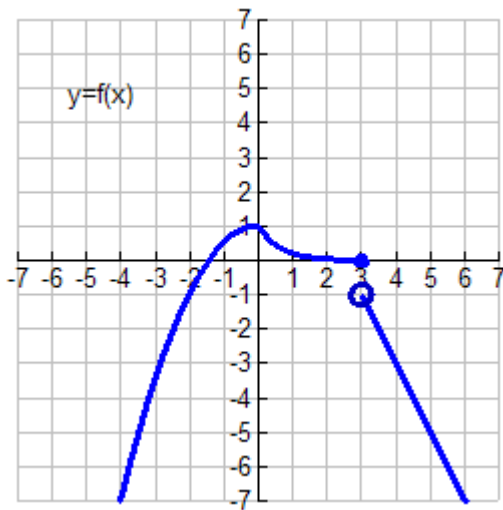
4. Find a function rule for the function  $f$  shown below.



5. An object is launched into the air with a velocity of 80 feet per second, with height,  $h$ , after  $t$  seconds given by  $h(t) = -16t^2 + 80t$  feet.
- Find the height of the object after 3 seconds.
  - Find the average velocity between  $t = 3$  and  $t = 4$ .
  - Estimate the instantaneous velocity when  $t = 3$  by calculating the average velocity over the following time intervals:  $[3, 3.01]$ ,  $[3, 3.001]$ , and  $[3, 3.0001]$ .
6. The half life of a certain radioactive substance is 350 years.
- Find a function for the amount remaining after  $t$  years in a sample of size 80 grams.
  - How much is left after 120 years? (Show algebraic solution.)
  - When will there be none of the substance left?

7. Evaluate  $\lim_{x \rightarrow 3} \frac{2x^2 - x - 15}{x^2 - 9}$ .

8. The graphs of  $f$  and  $g$  are shown below. Use them to evaluate each limit. If the limit does not exist, explain why.



a)  $\lim_{x \rightarrow 3} [f(x) + g(x)]$

b)  $\lim_{x \rightarrow 0} [f(x) + g(x)]$

c)  $\lim_{x \rightarrow 0} [f(x)g(x)]$

d)  $\lim_{x \rightarrow -2} \frac{f(x)}{g(x)}$

9. If  $f(x) = \sqrt{x-6}$ ,  $g(x) = 3e^{2x}$ , and  $h(x) = \frac{2}{x-3}$ , find  $f \circ g \circ h$  and state its domain.

10. Write the function  $g(y)$  which results from shifting the function  $f(y) = e^y$  to the left 2 units, then reflecting about the  $x$ -axis, then reflecting about the  $y$ -axis, stretching vertically by a factor of four, and translating up 9 units.

11. Find the values of  $a$  and  $b$  such that the function  $f(x)$  is continuous for all real numbers  $x$ .

$$\begin{cases} e^x & \text{if } x < 0 \\ 2x - a & \text{if } 0 \leq x < 2 \\ \cos x - b & \text{if } x \geq 2 \end{cases}$$

12. Find  $\lim_{x \rightarrow 7} \frac{\sqrt{x+2} - 3}{x-7}$ .

13. Find  $\lim_{x \rightarrow \infty} \frac{x-2}{\sqrt{4x^2+1}}$

14. Solve for  $y$ :  $2\log_2 y - \log_2(y-3) = \log_{10} 100$