

Math 1483 Exam 3 Study Guide

EXAM: 5:30 - 6:30 pm, Thursday, Nov. 15

Extra review: Wednesday, Nov. 14, 4pm - 5:30 pm MLSC West Room

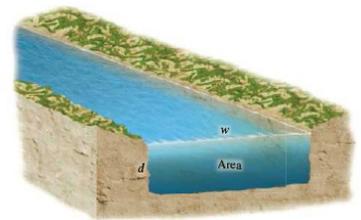
1. On Oct. 23, Lone Grove, OK had an earthquake that rated a 3.4 on the Richter Scale.
 - a. How many times more powerful is a quake that rates a 6.8?

 - b. How many times more powerful is a quake that rates a 4.4?

 - c. What would be the magnitude of a quake that is seven times as powerful?

 - d. What would be the magnitude of a quake that is 1/100th as powerful?

2. The cross-sectional area, C , in square feet, of a river is given by the formula $C = wd$, where w is the width of the river and d is the depth, both in feet. We use s to denote the speed of the water flow, in feet per minute. The flow rate F in cubic feet per minute is given by $F = sC$.



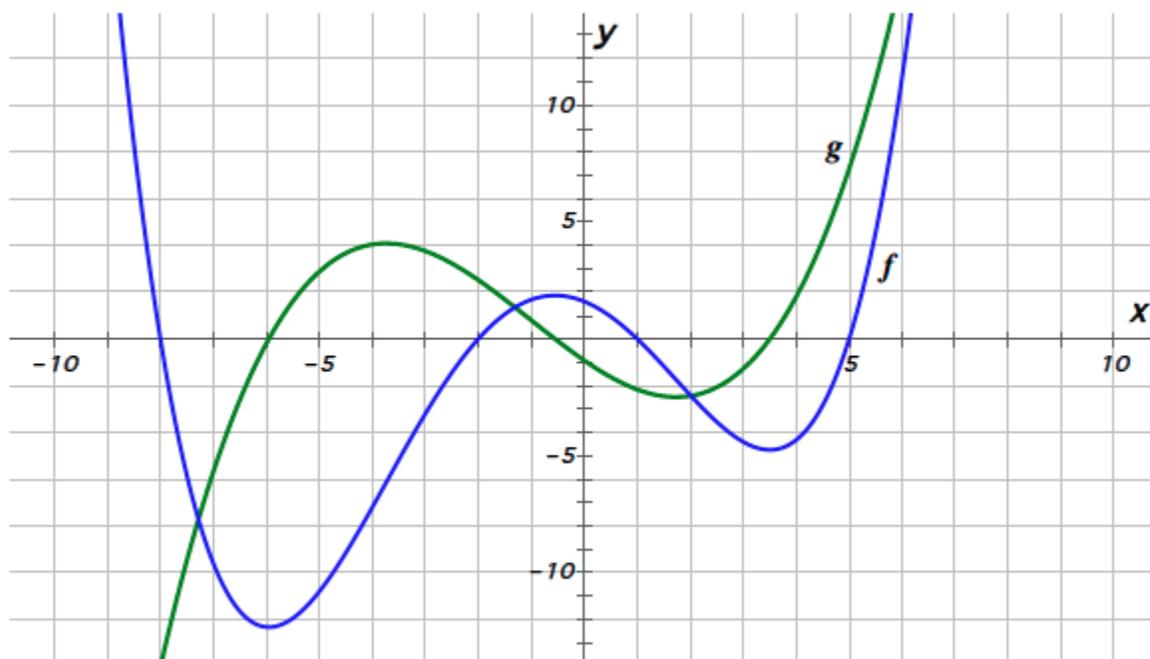
- a. Find a formula for F in terms of w , d , and s .

- b. Use the formula to find the flow rate of a river that has a width of 23 feet, a depth of 2 feet, and a flow speed of 24 feet per minute.

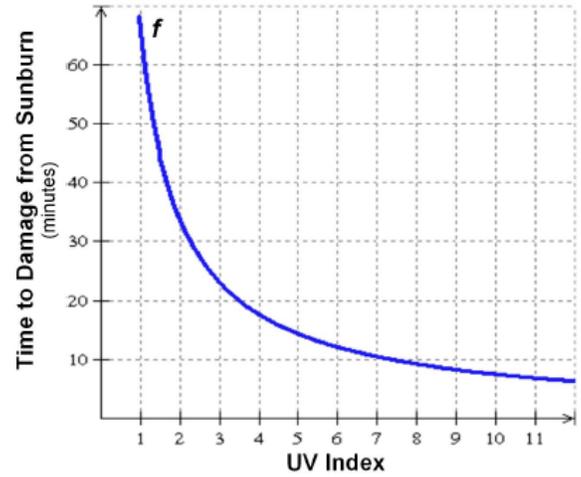
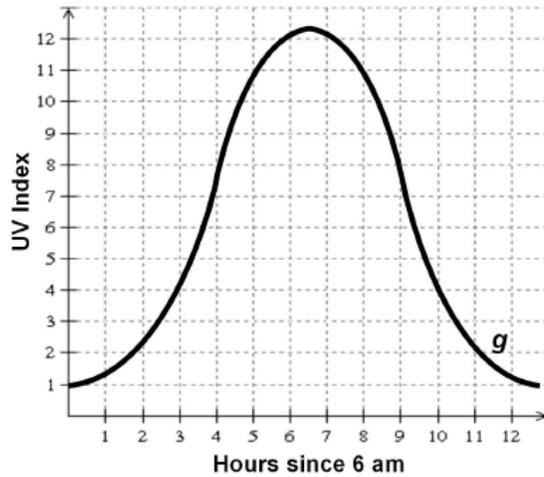
3. You're managing a snow cone stand for the summer. Your revenue R in dollars as a function of price p in dollars is given by $R(p) = p(150 - 50p)$.
- What does dR/dp mean in this context?
 - Give an example of a price for which dR/dp is positive. What should you do in this case? Why?
 - Give an example of a price for which dR/dp is negative. What should you do in this case? Why?
 - Give an example of a price for which dR/dp is 0. What should you do in this case? Why?
4. (THIS QUESTION IS MULTIPLE CHOICE) Let $T(I)$ denote the income tax, in dollars, that you pay on a yearly income of I dollars. The rate of change is known as the marginal tax rate. What is the meaning of marginal tax rate in practical terms?
- $T(I)$ is the change in the total tax you pay, in dollars, from one year to the next.
 - $T(I)$ is the additional tax you pay, in dollars, on each additional dollar earned.
 - $T(I)$ is the additional income you earn, in dollars, when tax rate decreases.
 - $T(I)$ is the total tax you pay, in dollars, of your yearly income.
 - $T(I)$ is the total income you earn, in dollars, after paying taxes.

5. The store Orange Republic has a sale in which you can take \$50 off the cost of a winter coat. You get 10% off your entire purchase if you sign up for an Orange Republic credit card.
- Let p represent the cost of the coat you want to buy before any discounts are applied. What does $C(p) = p - 50$ represent?
 - Let $F(C) = 0.9C$ represent the 10% discount. Find a formula for $F(p)$. What does $F(p)$ represent?

6. Two functions, f and g , are shown below. One of these is a rate of change function for the other. Which is which?



7. The functions f and g are graphed below. The function f tells you the time to sunburn as a function of the UV index. The function g tells you UV index as a function of the time of day in Hawaii (in hours after 6 am).



- Find and interpret $g(3)$. Round to the nearest whole number.
- Find and interpret $f(4)$.
- Find and interpret $f(g(3))$.
- If you start sunbathing at 10 am, how long will it take for you to sunburn?

8. Let $w(t)$ represent the weight of a baby in pounds t weeks after it is born. Suppose $w(0) = 8$ and when $t = 0$, $dw/dt = 0.5$.

a. What does dw/dt mean in practical terms?

b. Estimate $w(1)$.

9. In an average home, showers are typically the third largest water user after toilets and washing machines. The average shower uses 2.1 gallons of water per minute. Let $V(t)$ be the volume of water used for a shower.

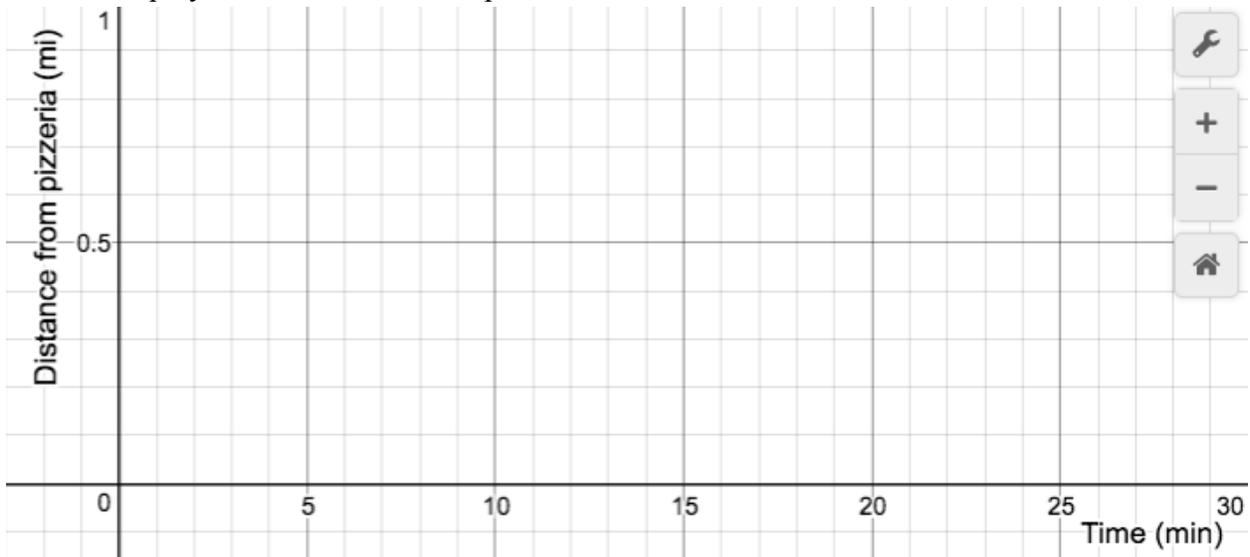
a. Find an equation for dV/dt .

b. Find an equation for $V(t)$.

c. Your hot water tank can hold 20 gallons, after which your shower will be cold. How long can you shower before the water runs cold?

10. You are at home, 0.4 miles from the pizzeria. At time 0, you call the pizzeria and order a large with extra pepperoni. You wait 5 minutes, then walk to the pizza store at a constant velocity. The walk takes ten minutes. It takes you five minutes to pay and collect the pizza, then you walk home at a constant velocity, which takes ten minutes.

a. Graph your distance from the pizza store as a function of time t in minutes.



b. Graph your velocity as a function of time t in minutes.



11. In the end of 2015, Wendy's revenue fell at a quarterly decay rate of $e^{-0.0325}$. Let $R(t)$ denote Wendy's revenue, in millions of dollars, t quarters after the end of 2015. Suppose the revenue continues to fall at this same rate.

a. What is the equation of change, in terms of R , for Wendy's revenue?

b. The revenue at the end of 2015 was \$489.5 billion. Find an equation for $R(t)$.

12. Some problems with just symbols:

a. Solve the equation of change $df/dx = 0.03$ if $f(0) = 7$.

b. Solve the equation of change $df/dx = 0.03f$ if $f(0) = 7$.

c. How are problems (a) and (b) different, and what gives you a clue that one is linear and one is exponential?