

## CALCULUS FINAL EXAM REVIEW CHAPTER 10

1. State the mean value theorem for integrals, including the conditions (§10-3) and include a sketch with short description of what this theorem means. Do the same with the mean value theorem for derivatives (§5-5).

2. For  $y = x + 2\sin(x - 3)$

(a) Find displacement from  $x = 0$  to  $x = 8$ .

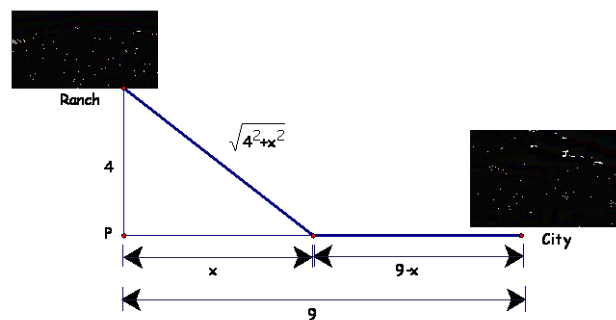
(b) Find distance for the same interval stated in part (a)

(c) Find the average value

(d) Find a point in the interval where  $f(x)$  equals the average value

(e) Sketch a graph that shows the geometric meaning of average value

3. Claude wants to build a dirt road from his ranch to the highway so that he can drive to the city in the shortest amount of time. The perpendicular distance from the ranch to the highway is 4 miles, and the city is located 9 miles down the highway. Where should Clint join the dirt road to the highway if the speed limit is 20 mph on the dirt road and 55 mph on the highway.



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4. An object moving along a line has velocity  $v(t) = 10(0.5 - 2^{-t})$  ft/sec.  
a. Find the distance it travels and its net displacement from the starting point for the time interval  $[0, 2]$ .

b. Find its acceleration at  $t = 0$

c. At  $t = 0$ , was the particle speeding up or slowing down? Justify your answer.

5. Use the information below to determine the value of  $x$  that would give the minimum cost. Show work. (You do not have to justify that the value is indeed a minimum here, but you may on the final exam.)

