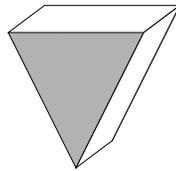


Math Xb Spring 2005

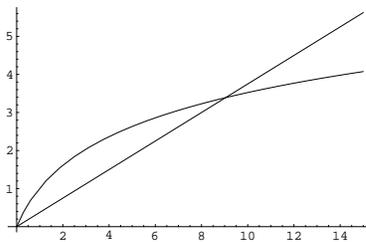
Midterm 2 Review Session

SOME PROBLEMS

1. A rocket is launched vertically and travels at 100 meters per second. A tracking radar is 500 meters from the launch site. When the rocket is 800 meters high, how fast must the radar antenna rotate (in radians per second) in order to track the rocket?
2. You want to construct a trough whose cross-section is an inverted triangle. The sides will each be 1 foot, and the amount of water the trough will hold will be determined by the angle θ between the two sides. Can you find an angle θ giving the greatest volume in the trough?



3. Find $\lim_{x \rightarrow 0}(1+x)^{1/x}$.
4. Suppose that the function $f(x) = .375x$ describes the rate of change of the height of a plant x days after it first breaks through the soil. Write an integral that represents change in height of the plant between day 2 and day 5. Find the exact change in height between day 2 and day 5.
5. Suppose that another function $g(x) = 1.55 \ln(x+1)$ describes the rate of change of the height of a section plant x days after it breaks through the soil. The two graphs are shown below.



Which plant is taller after 7 days? Write an integral that represents the difference in height after 7 days. Which plant is taller after 9 days? After 100 days?

6. Suppose that $f(x) \leq 12$ on the interval $[-3, 5]$. What can you say about

$$\int_{-3}^5 f(x) dx?$$

7. Let $c(u)$ represent a company's marginal cost in producing widgets. That is, $c(u)$ is the rate of change of the cost of producing u widgets. Describe the following area functions in terms of cost of producing widgets and in terms of area under a curve

- (a) ${}_0A_c(100)$
- (b) ${}_{50}A_c(100)$
- (c) ${}_{50}A_c(x) = 1000$
- (d) ${}_{50}A_c(x) - {}_0A_c(x)$