

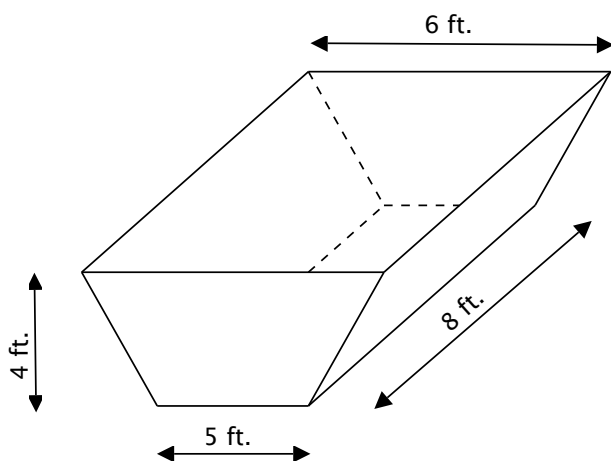
Calculus I - Math 124 Homework #7 - due Wednesday 11/14

• **Book Problems** (Not to be turned in, but still important):

- §3.9: 1-13 (Odd), 2, 18-20, 23, 27, 33, 35, 38, 42 (and any other problems that look interesting)
- §3.10: 1-4, 23, 25, 27, 32, 42a, 43, 44
- §3.11: 1-3, 31-39 (Odd), 51, 55

• **Problems to hand in:**

1. Water is being pumped at a rate of $4 \text{ ft}^3/\text{second}$ into a trough that is 8 feet long with ends that have the shape of an isosceles trapezoid with dimensions as shown in the figure.



- (a) How fast is the water level changing when the water level has a height of 2 feet?
- (b) How long will it take to fill up the trough?

2. Find the linearization of $g(x) = 8\sqrt[4]{x+1}$ at $x = 15$ and use it to approximate $g(15.05)$.

3. Suppose we know that $h(2) = -3$ and $h'(x) = x^2 + 1$.

- (a) Use linear approximation to estimate $h(1.9)$.
- (b) Is your estimate an over or underestimate? Explain.
(Hint: Consider the slope of $h(x)$ near $x = 2$.)

4. Find the n th derivative of $f(x) = \frac{x^n}{x-1}$.

(Hint: If your first few derivatives are looking scary, take a look at the original function and see if you can approach it differently.)