MATH 122Fall, 2001Exam # 2Name:For full credit you must show your work!

- 1. (16 points) Let $g(x) = -1 + 8x^2 e^{-1.5x}$.
 - a. Sketch the graph for y = g(x) for $-0.25 \le x \le 2.25$ and $-1.2 \le y \le 1.2$. At which value(s) of x does it appear that g'(x) = 0?

- b. According to your calculator g'(1.7) =_____ to **3** decimal places.
- c. Zoom in on the graph to estimate the instantaneous rate of change of g at at x = 1.7. Give all numbers to **3** decimal places. "I computed the slope (shown below) using the points (________, _______) and (________, _______). I chose these points because this part of the graph _________. I conclude that the instantaneous rate of change of g at x = 1.7 has the approximate value _______."

2. (16 points) Deep in a Hundred Acre Wood, it has been raining again, at an increasing rate. Pooh has recorded the rate r(t) in cm per hour, every so often. Estimate the total amount of rain that has fallen from 7:00 til 10:30 pm using left and right sums. This information is important to Piglet, on account of his short stature, so give the best possible estimate based on the data. Identify each sum as an over- or under- estimate. The total amount of rain is approximately cm.

Δt						
t (hr)	7:00	7:30	8:30	9:00	9:30	10:30
$r(t) \ (\mathrm{cm/hr})$	0.8	1.0	1.4	2.2	2.6	3.0

3. (10 points) The graph of z = f(t) is given below. Compute $\int_0^6 f(t) dt$.

4. (12 points) At a production level q = 96 ounces of perfume, the cost is C(96) = \$5000 and the marginal cost is C'(96) = 25 ______ (fill in the units). Give the best possible estimate based on this information for the cost of producing 100 ounces. Show your work!

- 5. (16 points) Baby clams start out as freely drifting larvae that settle on the seabed and stick there if the site seems comfy. But many die due to predation, or burial by sediment, or starvation. Let us suppose that the the number that have settled on a certain plot up through time t is S(t), and the number that have died there up through time t is L(t) (t is measured in days).
 - a. What mathematical quantity measures **how fast** the clams are settling, and how is this visualized?

b. When is the population of living clams the greatest? ______ Explain.

c. What is happening to the living clam population on day 30, and how do you see this from the graph?

- 6. (15 points) The graph of C'(q), that is, of marginal cost, of making orange juice is shown below. Production q is measured in tons, and C' is measured in hundreds of dollars per ton.
 - a.
 - C'(3) = (include the units). What does the quantity $\int_3^5 C'(q) dq$ represent in real-world terms? Also show how this quantity is represented graphically, and give a good estimate b. of its value.

7. (15 points) a. Compute $\int_{1}^{9} 5 \ln(x/2) dx$ by hand, using 4 equal divisions of width $\Delta x =$ ______. Show the table of values and the sums. Give the right sum, the left sum, and their average, with all numbers correctly rounded to 2 decimal places.

Give the built-in calculator value for this integral. _____ (To plot the b. function, I recommend a window with $1 \le x \le 9$ and $-5 \le y \le 8$.)