

Mathematics 122 Test #2

Name: _____

You are to use your own calculator, no sharing.**Show your work to get credit.** This means that if you use your calculator to solve a problem, then you have to write a sentence telling how you used it to do the calculations. (That is if you graphed it and zoomed in then say that is what you did etc.)

(1) (10 points) Draw Graphs of functions that satisfy the following:

(a) Is increasing at an increasing rate.

(b) Is decreasing and concave up.

(c) Has $f'(x) > 0$ and $f''(x) < 0$ (d) has $f''(x) < 0$ and $f'(-2) = 0$.(2) (10 points) Let a function $w(t)$ be given by the table

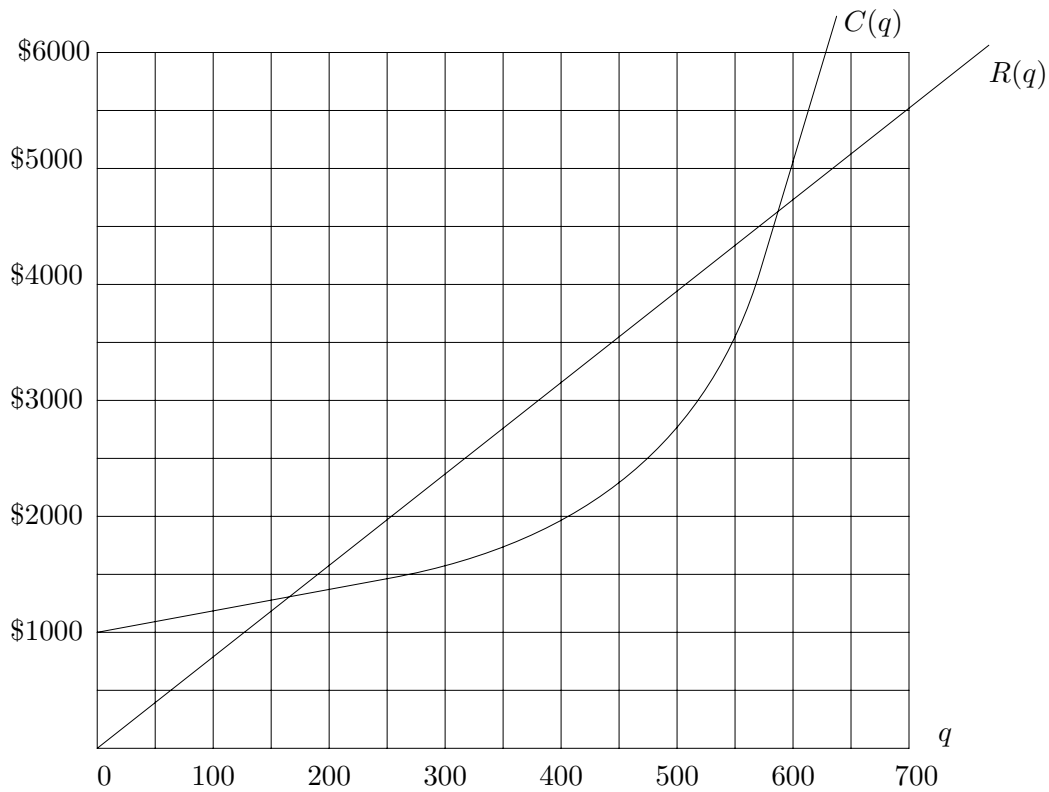
t	1	3	5	7
$w(t)$	4.5	5.6	7.8	10.9

(a) Approximate the derivative at the points 2, 4, 6.

t	2	4	6
$w'(t)$			

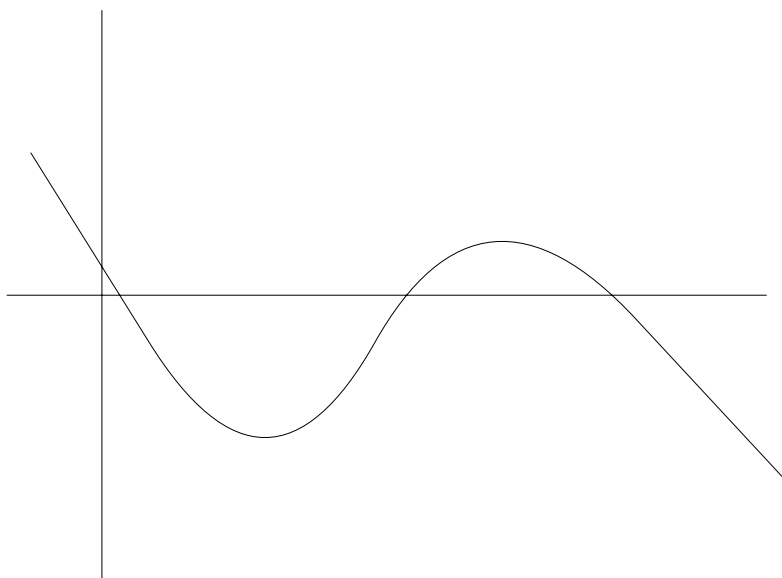
(b) Is the second derivative $w''(t)$ positive or negative? Explain your answer.(c) Estimate $w(3.6)$ $w(3.6) \approx$ _____

- (3) (15 Points) A group of students market a guide to what students from last year thought about the professors they had. The cost $C(q)$ and the revenue $R(q)$ of producing q of the guides is given in the graph below.

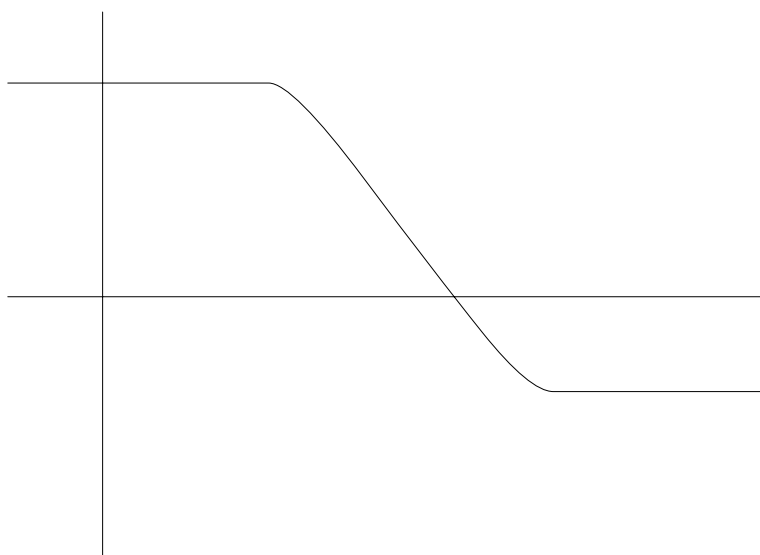


- (a) About how much were the startup costs of the for producing the guides? _____
- (b) At what price are the students selling the guide.? _____
- (c) What is the marginal cost of producing the 550th guide? _____
- (d) What is the marginal profit of producing the 550th guide? _____
- (e) If the students are producing 550 guides is it in their best interests to produce more or less guides? Give a sentence or two to explain your answer.
- (f) Make an estimate of the number of guides the students should produce to maximize their profit. _____

- (4) (10 points) For the functions given by the following graphs sketch a graph of the derivative on the same set of axis.



(a)



(b)

- (5) (5 Points) Let $f(x) = \frac{x}{x+1}$. Then give an upper bound on $\int_0^2 f(x) dx$ by splitting the interval $[0, 2]$ into four equal length subintervals and computing the upper sum.

Upper bound = _____

(6) (5 points) Sketch the graph of a function $y = f(x)$ so that

- $f'(x) < 0$ for $x < 1$,
- $f'(x) > 0$ for $1 < x < 3$,
- $f'(x) < 0$ for $3 < x$,
- $f(1) = -2$, and
- $f(3) = 4$

Your graph should not have any sharp corners.

(7) (10 Points) A car goes 60mph for 30min. It then goes for 45mph for a hour and slows down to 30mph for a hour and 15min.

(a) Sketch a graph of the speed of the car as a function of time

(b) How far did the car travel in the first two hours of the trip? _____

(8) (10 Points) Compute the following using your calculator

(a) $\int_1^3 \frac{2^x}{1+x^2} dx =$

(b) $f'(3.1)$ where $f(x) = 2(.75)^{2x}$. $f'(3.1) =$ _____

(9) (5 Points) If $f(t)$ is measured in calories/gram and t is measured in grams then what are the units of measurement for the following

(a) $f'(t)$ Units are _____

(b) $\int_1^3 f(t) dt$ Units are _____

(10) (10 Points) Gasoline is leaking out of a underground storage tank at the rate of $400(.85)^t$ gallons/day, where t is the number of days since the leak started. How many gallons of gasoline leaked out of the tank in the first 5 weeks after the leak started? _____

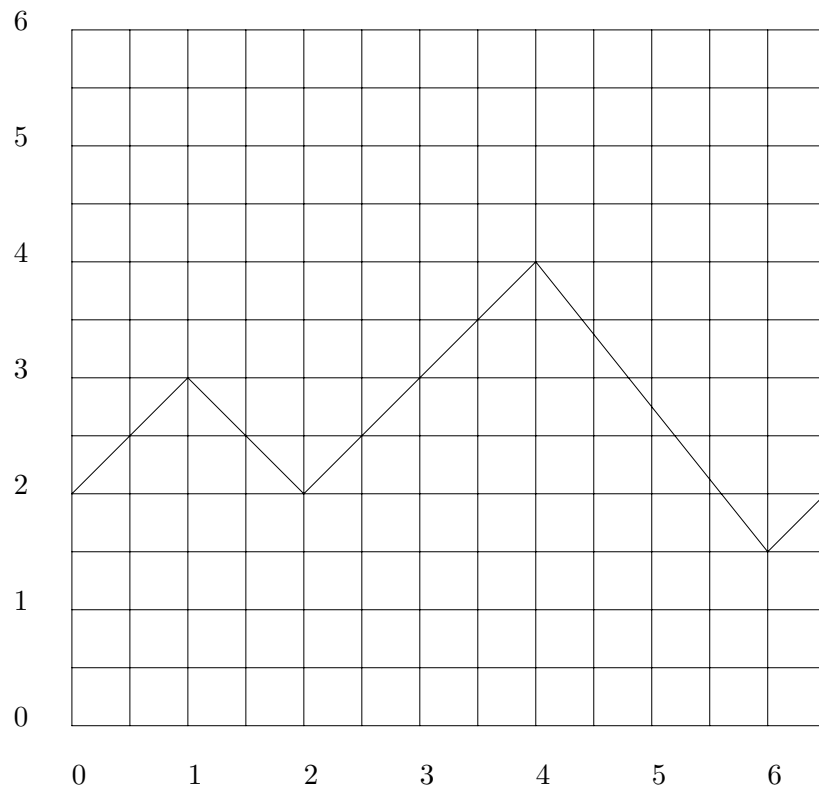
(11) (10 Points) A function $f(t)$ has values given by the table:

t	2.5	3.0	3.5	4.0	4.5
$f(t)$	4.0	3.8	3.5	3.1	2.6

Estimate $\int_{2.5}^{4.5} f(t) dt$.

$\int_{2.5}^{4.5} f(t) dt \approx$ _____

(12) (5 Points) Below is the graph of $y = f(t)$.



What is $\int_1^6 f(t) dt$.
