

MATH 112 C
Final Exam - Version 1
March 19, 2002

Name _____

Student ID # _____

Section _____

1	18	
2	13	
3	10	
4	17	
5	27	
6	15	
Total	100	

- You are allowed to use a calculator, a ruler, and one sheet of handwritten notes.
- You must show your work on all problems. The correct answer with no supporting work may result in no credit.
- If you use a trial and error method when an algebraic method is available, you will not receive full credit.
- Write your answers in the specified locations.
- If you need more room, use the backs of the pages and indicate to the reader that you have done so. If you still need more paper, please ask for some.
- Raise your hand if you have a question.
- You have 1 hour and 50 minutes to complete the exam.

GOOD LUCK!

1. (18 points - 6 points each)

(a) Compute $f'(x)$ if $f(x) = \frac{x^2 - e^x}{\sqrt{x} + \ln x}$. (Do not simplify.)

(b) Compute $\frac{\partial f}{\partial x}$ if $f(x, y) = \frac{3x^2}{y} - \frac{4y^3}{x} + \ln y$.

ANSWER: $\frac{\partial f}{\partial x} =$ _____

(c) Solve for m and b :

$$24b - 12m = 1176$$

$$8m + 5b = 600$$

Show all your work and round your answers to 2 digits after the decimal.

ANSWER: $m =$ _____, $b =$ _____

2. (13 points)

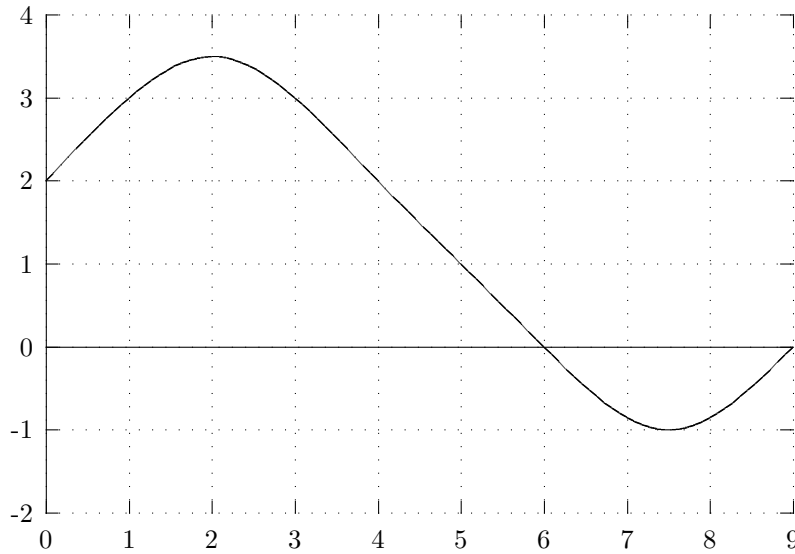
(a) (6 points) Compute $\int \frac{3}{\sqrt{x}} - 5x^7 + 2e^x dx$.

ANSWER: $\int \frac{3}{\sqrt{x}} - 5x^7 + 2e^x dx =$ _____

(b) (7 points) Compute $\int_1^5 6x - \frac{3}{25}x^2 dx$.

ANSWER: $\int_1^5 6x - \frac{3}{25}x^2 dx =$ _____

3. (10 points) The graph of $f(x)$ is given below.



Put the following in order from smallest to largest and explain your reasoning.

(a) $\int_0^9 f(x) dx$

smallest: _____

(b) $\int_6^9 f(x) dx$

(c) $\int_0^5 f(x) dx$

(d) $\int_0^6 f(x) dx$

(e) $\frac{f(9) - f(0)}{9}$

(f) $f'(2)$

largest: _____

explain:

4. (17 points) The Sunshine Juice Company makes two kinds of orange-tangerine juice blends. The Ultra Blend contains 80% orange juice and 20% tangerine juice. The Blend Super Pro contains 55% orange and 45% tangerine. Sunshine makes \$0.43 profit on each gallon of the Ultra Blend and \$1.05 profit on the Blend Super Pro. The supply of orange juice is limited to 4400 gallons per day and the supply of tangerine juice is limited to 2700 gallons per day.

Let x be the amount of Ultra Blend (in hundreds of gallons) produced in a day and let y be the amount of Blend super Pro (in hundreds of gallons) produced in a day.

- (a) (4 points) Give the formula for daily profit in hundreds of dollars: $P(x, y)$.

- (b) (4 points) Give the constraints for the problem.

- (c) (4 points) The vertices of the feasible region are (0,0), (0,60), (55,0), and (19.8, 51.2). Determine the maximum daily profit.

ANSWER: max profit is \$_____

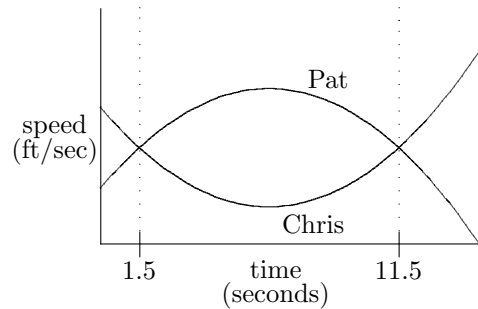
- (d) (5 points) If Sunshine produces 33 gallons of Ultra Blend and 32 gallons of Blend Super Pro, then how much of the 2700-gallon supply of tangerine juice will be left over?

ANSWER: _____ gallons left over

5. (27 points) Pat and Chris are driving along a long straight road. At time $t = 0$, Pat is passing a tree and Chris is 10 miles ahead of Pat. Let $P(t)$ be Pat's distance from the tree at time t and $C(t)$ be Chris' distance from the tree at time t . Then $P(0) = 0$ and $C(0) = 10$. Their speeds are given by the following functions which are graphed to the right.

Pat's speed: $p(t) = -t^2 + 13t + 23.5$

Chris' speed: $c(t) = t^2 - 13t + 58$



- (a) (6 points) Determine whether each of the following is true or false.
- T F Pat passes Chris at $t = 1.5$.
 - T F Pat drives farther than Chris during the first 11.5 seconds.
 - T F $C(m) = \int_0^m c(t) dt$.
- (b) (6 points) How far does Chris travel during the first 6 seconds?

ANSWER: _____ feet

- (c) (6 points) What is Pat's overall average trip speed at $t = 3$?

ANSWER: _____ feet per second

- (d) (6 points) How far is Chris from the tree after 4 seconds?

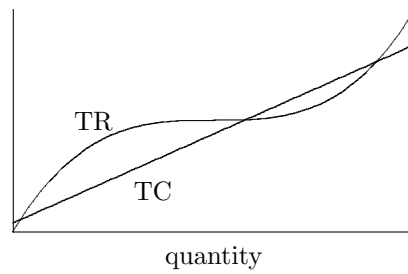
ANSWER: _____ feet

- (e) (3 points) Set up the equation that you would solve in order to determine when the two cars pass each other. (Do not attempt to solve the equation.)

6. (15 points) The formulas and graph of total revenue and total cost are given below.

$$TR : R(q) = q^3 - 15q^2 + 75q$$

$$TC : C(q) = 20q + 10$$



- (a) (5 points) Find the smallest quantity at which marginal revenue is equal to 15.
(Round to 2 digits after the decimal.)

ANSWER: $q =$ _____

- (b) (5 points) Average revenue is given by $\frac{R(q)}{q}$. Find a positive value of q at which average revenue equals marginal revenue.

ANSWER: $q =$ _____

- (c) (5 points) Find the longest interval on which marginal cost is greater than marginal revenue.

ANSWER: from $q =$ _____ to $q =$ _____