OPPORTUNITY TO EXCEL # 3
MATH 142
Business Calculus - Spring 2002
Dr. Patrice Poage
VERSION A

SIGNATURE: _____
(name)

SS #:

SECTION #:

ROW # YOU *NORMALLY* SIT IN:

ROW/SEAT # YOU ARE IN RIGHT NOW:

- All 17 problems are to be done on the test paper. You *must show work* to receive full credit on a problem. Include any intermediate steps and programs/functions you use on your calculator. If you do the work in your head, you must turn in your head to receive full credit.
- BOX all your answers!
- *SCHOLASTIC DISHONESTY WILL NOT BE TOLERATED.*

SHOW ALL YOUR WORK AND BOX ALL OF YOUR FINAL ANSWERS!!

1. (5 pts) Find the absolute maximimum and absolute minimum for $f(x) = 2x^2 - 12x + 5$ on the interval $(-\infty, \infty)$.

2. (6 pts) Elliot has 500 yards of fencing with which to fence in a pasture. One side of the pasture will be a river and does not need any fencing. What should the dimensions of the pasture be in order to maximize the area inside the fencing?

3. (6 pts) Kyndel decides to sprint a few laps around the track. Her coach clocks her speed every 2 minutes. Kyndel starts out really fast, but quickly gets tired and after 8 minutes she is so exhausted that she has to stop. The data her coach collected is below. Assuming Kyndel's speed is never increasing, give an *upper* and *lower* estimate for the distance Kyndel ran during these 8 minutes. Round answer to 2 decimal places and be sure to give units with your answer.

Time spent running (min)	0	2	4	6	8
Speed (miles per minute)	.21	.18	.11	.07	0

4. (5 pts) Evaluate and simplify: $\displaystyle\int \frac{2t^3 + 5}{\sqrt{t}}\, dt$

5. (5 pts) Evaluate and simplify: $\displaystyle\int \frac{5}{x \ln(x^4)}\, dx$

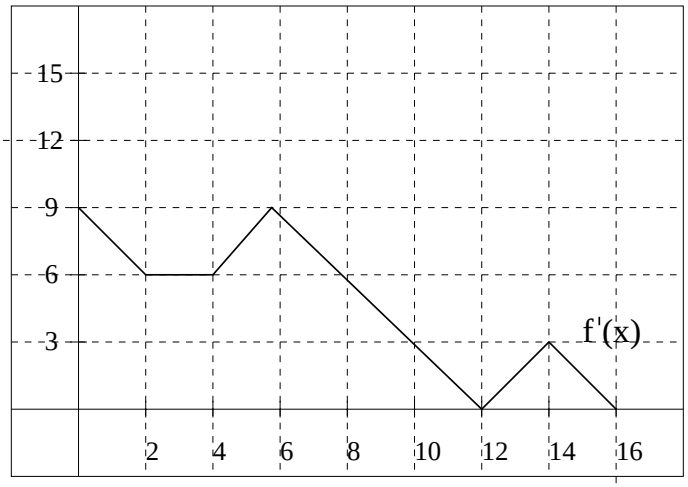
6. (6 pts) Find the revenue function for a golf ball manufacturer if the marginal revenue is given by $2x(3x^2 + 6)^2$, where x is the number of thousands of golf balls sold.

7. (5 pts) If you jump out of an airplane and your parachute fails to open, your downward velocity (in meters per second) t seconds after the jump is approximated by $v(t) = 49(1 - (0.8187)^t)$. How far do you fall during the first minute? (give units and round to 3 decimal places)

8. (6 pts) Evaluate $\int_w^{3w} (4x - 7)dx$ and simplify completely.

9. (6 pts) Find the area between $y = -2x^3 + 4x + 1$ and $y = -x^2 - 2x + 1$. Show ALL your work and round to 3 decimal places everywhere.

10. (5 pts) Using the figure to the right of $f'(x)$ and the fact that $f(2) = 13$, find $f(8)$.



11. (5 pts) An object is traveling at a velocity given by $v(t) = t^2 + 1$. Give an upper estimate for the distance the object traveled from t=1 to t=3, using 15 rectangles. Round your answer to 3 decimal places.

12. (5 pts) Evaluate and simplify: $\int \left(\frac{e^{-x} - e^{2x}}{4e^{-x} + 2e^{2x}} \right) dx$

13. (5 pts) Evaluate and simplify: $\int \left(\frac{x^2 - 4}{\sqrt{6x^3 - 72x + 10}} \right) dx$

14. (6 pts) Find the consumers' surplus if $D(x) = 10 - x^2$ and $p_o = 4$. Round your answer to 3 decimal places.

15. (6 pts) A cup of coffee at 90°C is put into a 20°C room when $t = 0$. The coffee's temperature, $f(t)$ is changing at a rate given by

$$f'(t) = -7(0.9)^t \, ^\circ C \text{ per minute,}$$

where t is in minutes. Estimate, to one decimal place, what the coffee's temperature is when t=10.

16. (6 pts) Find the relative maximum and minimum (and where they occur) for $f(x) = x^3 + 3x^2 - 9x - 7$ on the interval [-4,0].

17. (6 pts) Find the area between $y = \frac{1}{2}x^2 + 3x - 4$, the x=axis, $x = -10$, and $x = -5$. Show ALL work and round to 3 decimal places everywhere.