Spring 02 **Math 120 Final Exam Review** Prof. Brick

1. Let $p(t) = 0.1e^{-0.1t}$ for $0 \le t \le 60$ approximate a density function. Find the mean and median.

2. You decide to make Math T-shirts. You have fixed costs of \$166 and variable costs of \$5 per shirt. Find the cost equation. If you sell the shirts for nine dollars each, what is your break-even point ?

3. The depth of water in a tank oscillates once every 5 hours. The smallest depth is 4.6 feet and the largest is 9.3 feet. Find a formula for the depth as a function of time.

4. You are selling iced cappuccino's. If you charge one dollar, you end up making 600 sales every week. Each dime increase in price results in 20 fewer sales. Find and graph the demand curve.

5. If marginal revenue is greater than marginal cost, what should you do and why ?

6. Suppose $\int_a^b f(x)\,dx = 0$. What can you conclude ?

7. The population of Podunk grows at an annual rate of 6.5%. If initially there were 180,000 inhabitants, how long before the population reaches one million ?

8. Set up but do not compute a Riemann sum with 5 rectangles using the right-hand endpoints for approximating the area bounded by $y = e^{-x}$ from $x = -1$ to $x = 1$.

9. Draw a graph showing what $\int_{\frac{1}{3}}^{3} \ln(x)\,dx$ represents.

10. Find the cumulative distribution function for the density function graphed in exercise 3 on page 334.

11. Sketch a graph of a logistic population model. Explain why it is considered realistic.

12. Describe how the average cost can be represented graphically.

13. Describe how the average value of a function can be represented graphically.

14. Use the 2nd derivative test to classify the critical points of $y = 2x^3 - 3x^2$.

15. Find the derivative of $y = \sin(x^2 + 2)$.

16. Find the derivative of $y = x \cdot e^{-x}$.

17. Find the second derivative of $y = \ln(x^2 + 2)$.

18. A ball is dropped from rest and proceeds to bounce. Sketch the graph of its velocity. Explain.

19. Suppose $y = f'(x)$ is as pictured in exercise 2 on page 135. Find min/max's of $y = f(x)$.

20. You are driving slowly to your favorite class – Math 120, of course – when you realize that you have forgotten your plate of brownies. You turn around and drive very fast back home, where you very quickly get the brownies. Then you hop in your car and start back towards school. But in your excitement over another Calculus class, you drive way too fast and get pulled over for speeding. But you manage to use Calculus to convince the policeman to refrain from giving you a ticket, though it does take you some time. Then you drive off slowly, but speed up again as soon as the cop is out of sight. Let $f(t)$ be the distance you are from your favorite place in the world: your Calculus class, where t is time. (Note: $f(t)$ is not the distance you have travelled.) Sketch a graph of $f(t)$. Label the various sections of the graph.

21. A frozen pizza is placed in the oven for 20 minutes. Let $T(t)$ be its temperature at time t. Sketch the graph of $T'(t)$ for $0 \le t \le 30$.

22. Find $\int_1^4 \sqrt{x}\,dx$.

23. Do the bicylist problem, exercise 13 on page 195, and the mouse problem, exercise 22 on page 203.

24. Find the present value of five years worth of a continuous income stream of \$30k per year, assuming an annual return of 7.25%.

25. Review all the homework, quizzes, exam review sheets, exams, class notes, and everything else.