

1. (25 pts) (a) $\int_0^{\pi/4} \sec^2 x \, dx =$

(b) $\int \frac{x - x^2}{\sqrt{x}} \, dx =$

(c) $\int_0^{\sqrt{3}} x\sqrt{x^2 + 1} \, dx =$

(d) $\int \frac{\cos(\sqrt{x})}{\sqrt{x}} \, dx =$

2. (5 pts) Use the Fundamental Theorem of Calculus to find the derivative:

$$\frac{d}{dx} \int_0^{x^2} \sqrt{1+t^3} \, dt =$$

3. (7 pts) Find $f(x)$, given that $f''(x) = -6x$ and that the graph of $y = f(x)$ passes through the point $(1, 4)$, where it has a horizontal tangent line.

4. (8 pts) Evaluate this integral by interpreting it in terms of areas.

$$\int_{-3}^0 (1 + \sqrt{9 - x^2}) dx$$

5. (10 pts) (a) Estimate the area under the graph of $f(x) = \frac{1}{x}$ from $x = 1$ to $x = 3$ using four approximating rectangles and right hand endpoints.
(b) Repeat the procedure using left hand endpoints.

6. (10 pts) The sum of two positive numbers is 48. What is the smallest possible value of the sum of their squares?

7. (15 pts) You are supposed to enclose a rectangular field with a fence, and then divide the field in half with another fence parallel to one of the sides. If the field is to have an area of 600 square meters, find the dimensions that will minimize the total length of the fence.

page 1	/ 30
page 2	/ 25
page 3	/ 25
page 4	/ 20
Total	/100
Grade	

TAKEHOME PART DUE 11:00 AM, MONDAY, 12/4

8. (5 pts) Use Newton's method to find the root of $2x^3 - 6x^2 + 3x + 1 = 0$ in the interval $[2, 3]$. Use $x_1 = 2$ as the initial approximation, and give your answer correct to 6 decimal places.

9. (15 pts) For the function $f(x) = \frac{2x^2 + 1}{x^2 - 2x}$, find the vertical and horizontal asymptotes, the intervals on which it is increasing and decreasing, and all local maximum and minimum values. Then (on a separate sheet of paper) give a detailed sketch of the graph of the function. *Note:* You do *not* need to find $f''(x)$.