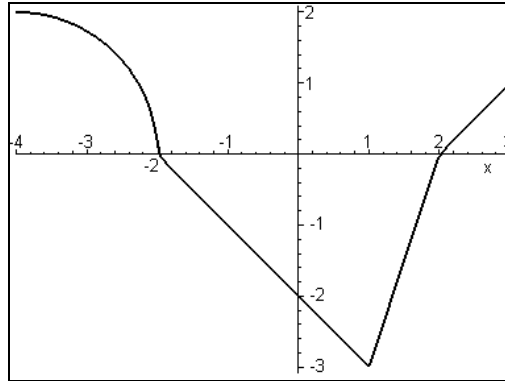


3. Consider the graph of $f(x)$ below, consisting of line segments and a quarter-circle.



Evaluate each of the following by using geometric formulas.

(a) **(4 points)** $\int_{-4}^0 f(x) dx$

(b) **(4 points)** $\int_1^3 f(x) dx$

(c) **(4 points)** $\int_{-4}^3 |f(x)| dx$

4. **(8 points)** Given the function $F(x) = \int_2^{\sqrt{x}} \arccos(t^3) dt$, find $F'(x)$.

For problems 5-8, evaluate the integral.

5. (8 points) $\int x\sqrt{1+x} dx$

6. (8 points) $\int \frac{x}{1+x^4} dx$

7. (8 points) $\int \frac{6\sec t \tan t}{\sec t + 6} dt$

8. (8 points) $\int x \tan(3x^2) dx$

9. Let f be continuous on the interval $[-5, 5]$. If $\int_0^5 f(x) dx = 4$, find the following:

(a) (2 points) $\int_0^5 [f(x) + 2] dx$

(b) (2 points) $\int_{-2}^3 f(x+2) dx$

(c) (2 points) $\int_{-5}^5 f(x) dx$ for f even.

10. (4 points) State either Fundamental Theorem of Calculus and explain what it means.

BONUS (Optional 5 points)

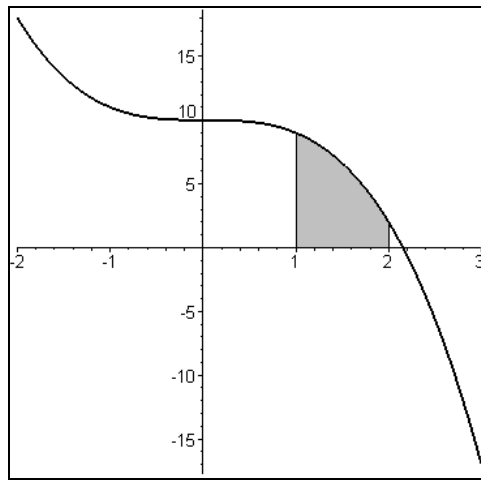
Evaluate the integral $\int \frac{1}{1 + \sin x} dx$.

MTH 150
Sample Exam 4

Name: _____

DIRECTIONS: Calculators are permitted on this part of the exam. However, answers based solely on calculator results are unacceptable. You must still show all work to receive full credit. Good luck.

11. The region whose area is given by the definite integral $\int_1^2 (10 - x^3) dx$ is shown below.



- (a) **(6 points)** Approximate the area of the above region using left endpoints of 4 subintervals (rectangles) of equal width.

- (b) **(4 points)** Use the Fundamental Theorem of Calculus to find the exact area.

12. Compute the definite integrals. **Note: Decimal approximations from the calculator earn no points. Show work for credit.**

(a) (7 points) $\int_0^3 \frac{1}{\sqrt{1+x}} dx$

(b) (7 points) $\int_{-\pi/4}^{\pi/4} \sin(2x) dx$