MATH 160 Exam 4
 Name

 CCU Dept. of Math/Stats
 Score

 Sample A
 Score

1. (28 points) Evaluate the following indefinite integrals.

(a)
$$\int 3x^5 + \frac{1}{1+x^2} dx =$$

(b)
$$\int \sqrt[4]{x^7} + \frac{1}{\sqrt[4]{x^7}} \, dx =$$

(c)
$$\int \sec(x) \tan(x) + \csc(x) \cot(x) dx =$$

(d)
$$\int e^x + \frac{1}{x} dx =$$

2. (16 points) Evaluate the following integrals. Show your work. If you choose to make an educated guess, be sure to check your answer as justification of your work.

(a)
$$\int \frac{x}{(x^2+1)^2} \, dx =$$

(b)
$$\int (1 + \tan \theta)^2 \sec^2 \theta \ d\theta =$$

3. (14 points) Evaluate the following definite integrals. Show work.

(a)
$$\int_{1}^{3} 1 + 2x - 4x^{3} dx =$$

(b)
$$\int_0^{\pi} \sin(x) \, dx =$$

- 4. (12 points) The graph of $f(x) = x^2 x 6$ is shown below.
 - (a) Divide the closed interval [-2, 2] into 4 equal subintervals and draw the corresponding rectangles using the **left** endpoints of each subinterval.



(b) Find the Riemann sum for $f(x) = x^2 - x - 6$ on the interval [-2, 2] for n = 4, taking the sample points to be left endpoints.

(c) Express the integral $\int_{-2}^{2} x^2 - x - 6 \, dx$ as a limit of Riemann sums. Do not evaluate the limit.

5. (12 points)

(a) A particle moves along a line with a velocity described by the function $v(t) = t^2 - 2t - 8$, where v is measured in meters per second. Given that s(0) = 1 meters, find the position function s(t).

(b) Calculate the displacement of the particle over the time interval [1, 6].

(c) Calculate the total distance traveled by the particle over the time interval [1, 6].

6. (18 points) The graph of f below consists of line segments. Use the graph to evaluate the following definite integrals.



(a)
$$\int_0^2 f(t) dt =$$
 (c) $\int_5^7 f(t) dt =$

(b)
$$\int_{4}^{5} f(t) dt =$$

7. Let
$$g(x) = \int_{1}^{x^2} \frac{t}{\sqrt{1+t^2}} dt$$
. Find the derivative of g .