# MATH 160 Exam 4 <br> CCU Dept. of Math/Stats <br> Sample A 

Name $\qquad$
Score $\qquad$

1. (28 points) Evaluate the following indefinite integrals.
(a) $\int 3 x^{5}+\frac{1}{1+x^{2}} d x=$
(b) $\int \sqrt[4]{x^{7}}+\frac{1}{\sqrt[4]{x^{7}}} d x=$
(c) $\int \sec (x) \tan (x)+\csc (x) \cot (x) d x=$
(d) $\int \mathrm{e}^{x}+\frac{1}{x} d x=$
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) $\int \frac{x}{\left(x^{2}+1\right)^{2}} d x=$
(b) $\int(1+\tan \theta)^{2} \sec ^{2} \theta d \theta=$
3. (14 points) Evaluate the following definite integrals. Show work.
(a) $\int_{1}^{3} 1+2 x-4 x^{3} d x=$
(b) $\int_{0}^{\pi} \sin (x) d x=$
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 $\int_{-2}^{2} x^{2}-x-6 d x$ 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 $v(t)=t^{2}-2 t-8$, 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) $\int_{0}^{2} f(t) d t=$
(c) $\int_{5}^{7} f(t) d t=$
(b) $\int_{4}^{5} f(t) d t=$
7. Let $g(x)=\int_{1}^{x^{2}} \frac{t}{\sqrt{1+t^{2}}} d t$. Find the derivative of $g$.
