Midterm 1

Math 252

Winter 2022

You have 50 minutes to complete this exam and scan and upload it to Canvas. **Show all your work. You may use a scientific calculator, but not a graphing one.** When you're finished, first check your work if there is time remaining, then scan the exam and upload it to Canvas. If you have a question, don't hesitate to ask — I just may not be able to answer it.

1. (32 points) Multiple choice. You don't need to show your work.

a) (8 points) What is $1 + 2 + 3 + \cdots + 499 + 500$?

A) 62500.

B) 125250.

C) 175500.

D) 250000.

b) (8 points) What is $\int \frac{1}{x}\, dx$?

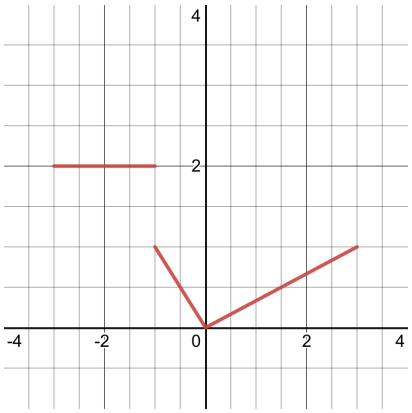
A) $\ln|x| + C$.

B) $\sin(x) + C$.

C) $-\frac{1}{x^2} + C$.

D) $x^2 + C$.

c) (8 points)



Let $f(t)$ be defined by the previous graph. Then $\int_{-2}^{1} f(t)\, dt$ is

A) positive.

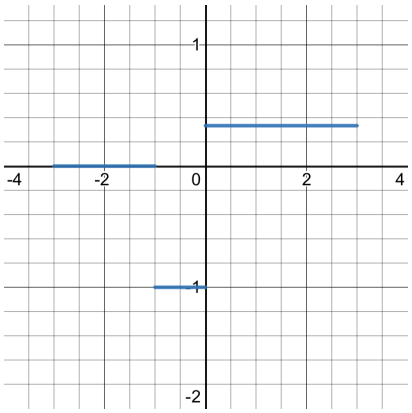
B) negative.

C) zero.

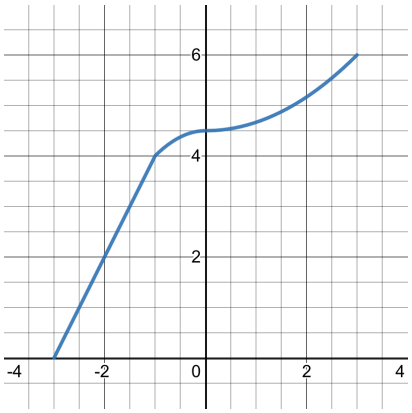
D) undefined.

d) (8 points) With f defined from the same graph as before, let $g(x) = \int_{-3}^{x} f(t)\,dt$. Which of the following could possibly be a graph of g?

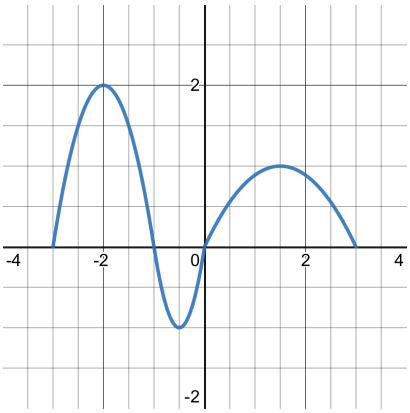
A)



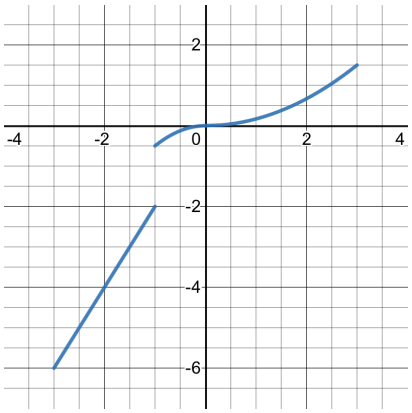
B)



C)



D)



2. (32 points) Short-answer. Explain your reasoning and/or show your work for each question.

a) (8 points) Write and evaluate the Right Riemann sum with 4 subintervals for the function $f(x) = x^3$ on $[-2, 2]$. You don't need to simplify your answer, but it cannot contain a sum symbol.

b) (8 points) Evaluate $\frac{d}{dx} \int_2^{\ln(x)} \frac{\sin(r)}{r}\ dr$.

c) (8 points) Evaluate $\int_2^4 (x^2 + x)\ dx$.

d) (8 points) Evaluate $\int 3t^3 \sin(t^4)\ dt$.

3. (32 points) Let $v(t) = 2 - 2t$ be the velocity of a particle at time t.

a) (8 points) Find a formula for $a(t)$, the acceleration of the particle at time t.

b) (12 points) Find a formula for $s(t)$, the position of the particle at time t, given that $s(3) = 2$.

c) (12 points) Find the total distance traveled by the particle from time $t = 0$ to time $t = 3$.

e) (8 points extra credit) Let $e(x)$ be the average position of the particle from time 0 to time x. Find $e(x)$.