

MTH 151

Exam 4

Fall 2022

Show all work in a neat and organized fashion. Clearly indicate your answers.
100 points possible.

Formulas and unit circle are on the last page, which you may pull off.

Graphing calculator OK but not one with CAS (e.g., no TI-89, no TInspire).

0. (4 pts.) Four free points

1. (12 pts.) Find the indefinite integral.

(a) $\int (6x - 9) dx$

This question means find the most general antiderivative of $f(x) = 6x - 9$

(b) $\int \frac{8}{x^7} dx$

2. (12 pts.) Find the indefinite integral.

(a) $\int \frac{5\sqrt{t} + 6 - 4t}{\sqrt{t}} dt$

(b) $\int (3 \cos \theta + 6 \sec^2 \theta) d\theta$

3. (12 pts.) Evaluate the integral.

(a) $\int_0^1 (u + 7)(u - 4) du$

(b) $\int_1^2 \frac{s^6 + 1}{s^3} ds$

4. (12 pts.) Find the limit, if it exists. Your answer must be fully supported with symbolic (algebraic) work.

$$\lim_{x \rightarrow \infty} \frac{\sqrt{5x + 4x^2}}{6x - 1}$$

5. (12 pts.) A farmer wants to fence an area of 242,000 square meters in a rectangular field and then divide it into 3 equal pens with some internal fences, all parallel to the same side of the rectangle. What dimensions of the field will minimize the total length of fencing? Use calculus methods. Include work that justifies why your answer gives an absolute minimum.

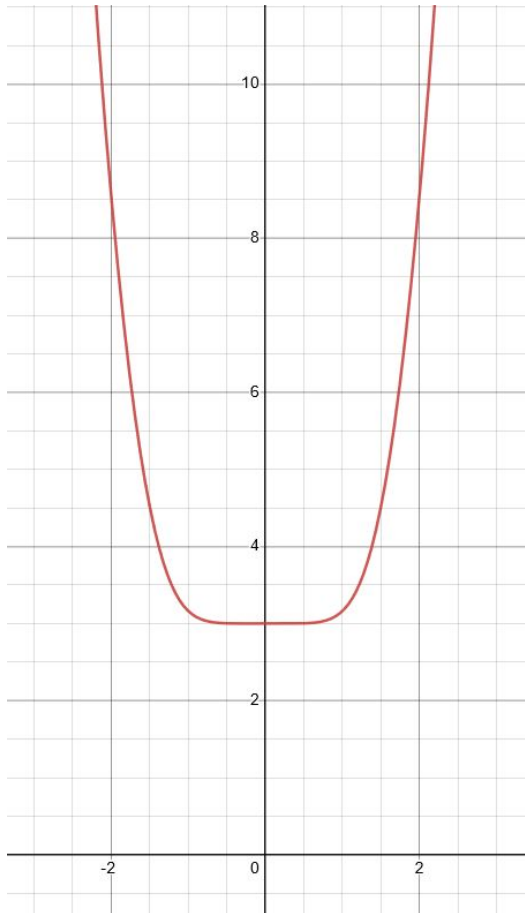
6. (12 pts.) A car is moving forward at a speed of $v(t)$ feet per second, where $v(t)$ is a continuous function. Selected values of $v(t)$ are shown in the table.

t (s)	0	10	20	30	40	50	60
$v(t)$ (ft/s)	168	146	56	46	83	158	156

Use a left Riemann sum with six subintervals to find an estimate of $\int_0^{60} v(t) dt$, the total distance traveled.

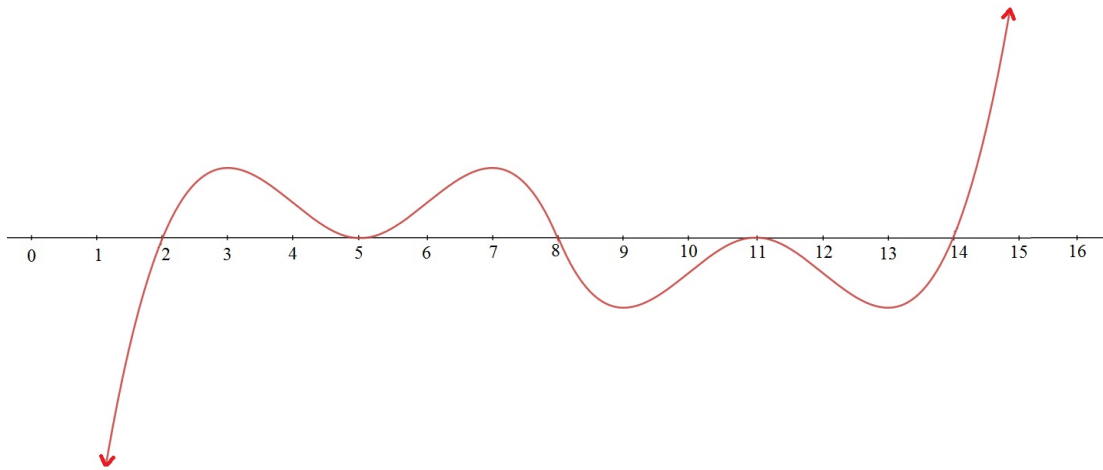
7. (12 pts.) Use Property 8 of Integrals to estimate the value of the integral, showing all work.

$$\int_{-2}^2 \sqrt{9 + x^6} dx$$



8. (12 pts.) In each part use the given graph to state the x -coordinates of the inflection points of f . Give reasons for your answers.

(a) The curve is the graph of f' .



(b) The curve is the graph of f'' .

