

Practice Problems for Final Exam, Part III

1. A poster is to have an area of 180 square inches with one inch margins at the bottom and sides and a two inch margin at the top. What dimensions will give the largest printed area?

2. For what value of c is the function

$$f(x) = \begin{cases} cx^2 + 2x & \text{if } x < 2, \\ x^3 - cx & \text{if } x \geq 2 \end{cases}$$

continuous on $(-\infty, \infty)$?

3. Below are the graphs of a function f and an anti-derivative F . Which is which? Give reasons for your answer.

a

b

4. Find the following limits. Show all steps.

a) $\lim_{x \rightarrow \infty} \frac{\sqrt{9x^6 - x}}{x^3 + 1}$

b) $\lim_{h \rightarrow 0} \frac{\tan^2(\pi/4 + h) - 1}{h}$

5. Express the limit $\lim_{n \rightarrow \infty} \sum_{i=1}^n x_i \cos(x_i^2) \Delta x$ as a definite integral on the the interval $[0, \pi]$ and evaluate the integral.

6. Let $g(x) = \int_0^x s(t) dt$, where s is the function whose graph is below. When is g increasing and where is it decreasing? When is g concave up and where is it concave down? Locate the local extrema of g .