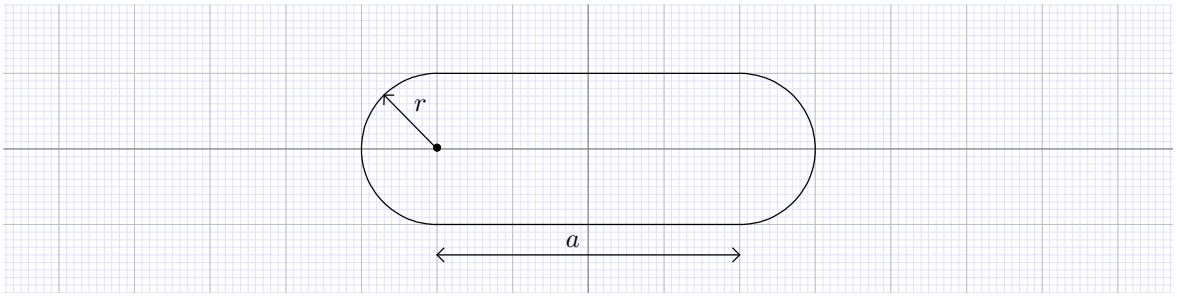
MATH 231.FA22 Practice Test 3

Solve the following exercises explaining all solution steps. (45 minutes)

1. Determine the maximal area of two-semicircles and a rectangle that can be enclosed within a known perimeter P.



2. Construct the linear approximant of $f(x) = \ln(1+x)$ at $a = 0$.

3. Determine the limit

$$L = \lim_{c \to 3} \frac{c - 1 - \sqrt{c^2 - 5}}{c - 3}.$$

4. Determine the limit

$$L = \lim_{x \to \infty} \frac{\ln(3x + 5e^x)}{\ln(7x + 3e^{2x})}.$$

5. Evaluate the integral

$$I = \int \frac{e^{2x} - 5e^x + 4}{e^x - 1} \, \mathrm{d}x.$$