
CALCULUS 106 – SECOND MIDTERM EXAM – APRIL 15, 2002

*Please attempt all the problems and show all your work. Don't hesitate to ask me for clarification on any questions you may have. You may **not** use any notes, books or calculators.*

1 . (20 points) Draw the graph of $f(x) = \frac{x^2 - 3}{x + 2}$. Include all critical points, local max/min's, inflection points, and asymptotes.

2 . (15 points) Find the largest area of a rectangle with base along the x -axis, the left side along the y -axis, and the upper right corner on the curve $y = 3 - x^2$.

3 . (10 points each) Compute the following:

(a) $\lim_{x \rightarrow \infty} (1 + \sin(1/x))^x$

(b) $\lim_{x \rightarrow 0} \frac{e^x - 1}{\ln(1 + x)}$

4 . (10 points) Solve the initial value problem:

$$\frac{dT}{dt} = \sin(\pi t) , T(0) = 3 .$$

5 . (10 points each) Compute the following:

(a) $\int_0^1 3^x dx$

(b) $\frac{d}{dx} \int_2^{\ln x} e^{-u} du$

6 . (15 points) Find a number $a > 0$ so that $\int_{-a}^a (1 - |x|) dx = 0$.
