

Homework 1 MATH 242-011, Due Monday February 23

You are not suppose to use calculators. Show all your work. Write on one side of the paper only.

• **PART I.** Review of exponential and logarithmic.

1. Solve for x : (a) $e^{2-3x} > 4$ (b) $2 \ln(5 - 2x) = -3$.
2. Differentiate $y = \ln|2 - x - 5x^2|$.
3. Use logarithmic differentiation to find the derivative of $y = \left(\frac{x^2+1}{x^2-1}\right)^{\frac{1}{4}}$.
4. Find $\lim_{x \rightarrow 2^+} e^{\frac{3}{2-x}}$.

• **PART II.** Indeterminate Forms (Section 4.4)

Find the limits:

- 1) $\lim_{x \rightarrow 0} \frac{1 - \cos x}{x^2 + x}$,
- 2) $\lim_{x \rightarrow \infty} \frac{e^{2x}}{x^3}$,
- 3) $\lim_{x \rightarrow 0} \frac{\tan px}{\tan qx}$,
- 4) $\lim_{x \rightarrow 1} \frac{\ln x}{\sin \pi x}$,
- 5) $\lim_{x \rightarrow +\infty} x^3 e^{-x^2}$
- 6) $\lim_{x \rightarrow \infty} \frac{\ln \ln x}{x}$,
- 7) $\lim_{x \rightarrow 1^+} \ln x \tan(\pi x/2)$,
- 8) $\lim_{x \rightarrow 1} \left(\frac{x}{x-1} - \frac{1}{\ln x}\right)$,
- 9) $\lim_{x \rightarrow \infty} (xe^{1/x} - x)$
- 10) $\lim_{x \rightarrow 0^+} x^{x^2}$,
- 11) $\lim_{x \rightarrow 0^+} (\tan 2x)^x$,
- 12) $\lim_{x \rightarrow \infty} (e^x + x)^{1/x}$,
- 13) $\lim_{x \rightarrow \infty} x^{(\ln 2)/(1+\ln x)}$
- 14) $\lim_{x \rightarrow \infty} \left(1 + \frac{a}{x}\right)^{bx}$,
- 15) $\lim_{x \rightarrow \infty} \frac{\sqrt{x^2 + 2}}{2x}$.

• **PART III.** Areas between curves (Section 6.1)

Sketch the region enclosed by the given curves. Find the area of the region.

- 1) $y = x + 1$, $y = 9 - x^2$, $x = -1$, $x = 2$.
- 2) $y = 1/x$, $y = 1/x^2$, $x = 2$.
- 3) $y = \cos x$, $y = \sin 2x$, $x = 0$, $x = \pi/2$.
- 4) $y = \sqrt{x+2}$, $y = \frac{1}{x+1}$, $x = 0$, $x = 2$.