Kuwait University | Math.102 | May 15, 1997
Dept.of Math.&Comp.Sci. | Midterm 2 | Duration: 50 min

Extra Questions

---

1. Evaluate the limit, if exists.

   (a) $\lim_{x\to 0}\left(\frac{1}{x^2}-\frac{1}{x^2\sec x}\right)$

   (b) $\lim_{x\to\infty}\frac{\ln(2+e^x)}{3x}$

2. Find the centre, foci and vertices for the following conic sections and sketch the graph.

   (a) $9x^2-4y^2-18x-16y+29=0$

   (b) $25x^2+16y^2+150x-128y-1119=0$

3. Evaluate the following integrals

   (a) $\int\frac{x\tan^{-1}x}{\sqrt{1+x^2}}\,dx$

   (b) $\int\frac{x^4-2x^2+4x+1}{x^3-x^2-x+1}\,dx$

   (c) $\int\frac{(x-3)^2}{\sqrt{-x^2+6x-5}}\,dx$

   (d) $\int\sqrt{1+\sin x}\,dx$

4. Determine if the following improper integral converges or diverges. If it converges, find its value.

   (a) $\int_3^\infty\frac{dx}{x^2-2x-3}$

   (b) $\int_0^1 x\ln x\,dx$

5. Find the length of the arcs

   (a) $x=t-a\tanh\frac{t}{a},\quad y=a\operatorname{sech}\frac{t}{a}\quad(a\le t\le 2a)$,

   (b) $x=\tan^{-1}t,\quad y=\frac{1}{2}\ln(t^2+1)\quad(0\le t\le 1)$.