Kuwait University | Math 101 | Date: August 3, 2002
Dept. of Math. & Comp. Sci. | Final Exam | Duration: Two Hours

dculators, Mobile Phones, Pagers and all other mobile communication equipments are not allowed

Answer the following questions:

(a) Evaluate the following limit, if it exists, $\lim_{x\to 5}\dfrac{\sqrt{x-1}-2}{x-5}$. (4 pts.)

(b) Find the points (if any) at which the graph of $y=\left(1-x^{\frac{2}{3}}\right)^{\frac{3}{2}}$ has a cusp. (4 pts.)

(a) Classify the points of discontinuity of $f(x)=\dfrac{x(x^2-1)}{|x|\,(x^2+x-2)}$ as removable, infinite or jump. (4 pts.)

(b) Find the average value, f_{av}, of $f(x)=6x^3-5x$ on $[-2,2]$. (4 pts.)

. The volume V of a right circular cylinder of radius r and height h is changing. If r is increasing at a rate of 1 $cm/\sec$ and h is decreasing at a rate of 1 $cm/\sec$. How fast is V changing when $r=10$ cm and $h=6$ cm. (4 pts.)

Evaluate the following integrals:

(a) $\displaystyle\int \frac{x}{\sqrt[3]{(x^2+1)^5}}\,dx$ (4 pts.)

(b) $\displaystyle\int_{\frac{\pi^3}{8}}^{\pi^3}\frac{\sin(\sqrt[3]{x})}{\sqrt[3]{x^2}}\,dx$ (4 pts.)

(a) Find the area bounded by the graphs of the equations $x=y^2$ and $x-y=2$. (4 pts.)

(b) Let $f(x)=\displaystyle\int_0^x\sqrt{2t^2+t^4}\,dt$. Find the arc length of the curve $y=f(x)$ from $A(0,f(0))$ to $B(1,f(1))$. (4 pts.)

Set up an integral that can be used to find the volume of the solid obtained by revolving the region bounded by the graphs of the equations $y=4x-x^2$ and $x=y$ about:

(a) the line $x=3$, (2 pts.)

(b) the line $y=-2$. (2 pts.)