Stopping at 2

$\mathcal{E}_r(0,1,2) = \frac{F^4(c)}{2!}$

Suppose $m \geq |f_{xx}|, |f_{xy}|, |f_{yy}|$ for c btw 0 & 1

$|\text{error}| \leq \frac{1}{2}(mh^2 + 2mhk + mk^2)$

$= \frac{m}{2}(h^2 + 2hk + k^2)$

$= \frac{m}{2}(h+k)^2$

10/9/14

EXAM TOMORROW!! 8 quizzes + 2 others

homework questions:

quadratic approx.

$f(xy) = \cos x \cos y$ at origin

estimate error if

$|x|, |y| \leq 0.1$

should know!

$e^t = 1 + t + \frac{t^2}{2!} + \frac{t^3}{3!} + \frac{t^4}{4!} \cdots$

$\cos(t) = 1 - \frac{t^2}{2!} + \frac{t^4}{4!} - \frac{t^6}{6!}$

$\sin(t) = t - \frac{t^3}{3!} + \frac{t^5}{5!} - \frac{t^7}{7!}$

$\frac{1}{1-t} = 1 + t + t^2 + t^3 + t^4$

$\cos x \cos y = (1 - \frac{x^2}{2!} + \frac{x^4}{4!} \cdots)(1 - \frac{y^2}{2!} + \frac{y^4}{4!} \cdots)$

$1 - \frac{y^2}{2!} + \frac{y^4}{4!}$

$-\frac{x^2}{2!} + \frac{x^2}{2!}\left(-\frac{y^2}{2!}\right) \approx 1 + \frac{-x^2}{2!} + \frac{-y^2}{2!}$

$\frac{1}{3!} M(|x|+|y|)^3$ where $M \geq |f_{xxx}|, |f_{xxy}|, |f_{xyy}|, |f_{yyy}|$

$M \geq 1$

$\frac{1}{3!}(1)(|x|+|y|)^3$

$\boxed{\frac{1}{6}(.2)^3}$ ← error term

Find Taylor series.

$$\frac{1}{1-x-y} = \frac{1}{1-(x+y)} = 1+(x+y)+(x+y)^2+(x+y)^3 \cdots$$

look back to previous page "should knows" & treat $(x+y)$ as t.

14.2 #17 ?

$$\lim_{\substack{(x,y)\to(0,0) \\ x\neq y}} \frac{x-y-2\sqrt{x}-2\sqrt{y}}{\sqrt{x}-\sqrt{y}}$$

$$\frac{x-y+2(\sqrt{x}-\sqrt{y})}{\sqrt{x}-\sqrt{y}} \cdot \frac{\sqrt{x}+\sqrt{y}}{\sqrt{x}+\sqrt{y}}$$

$$= \frac{(x-y)(\sqrt{x}+\sqrt{y})+2(x-y)}{x-y}$$

$$= \frac{\cancel{(x-y)}(\sqrt{x}+\sqrt{y}+2)}{\cancel{(x-y)}}$$

$$= \sqrt{x}+\sqrt{y}+2$$

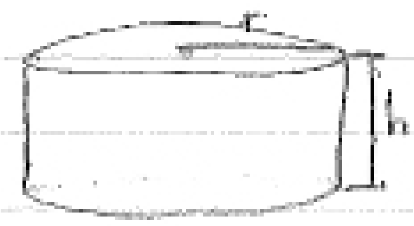
$\lim \sqrt{x}+\sqrt{y}+2$

$\lim = \boxed{2}$

Section 8 #9

Find dimensions of can

Smallest surface area



Volume $= 16\pi$

Volume $= \cancel{\pi} r^2 h = 16\cancel{\pi}$ ← constraint

Surface Area $= 2\pi r h + 2\pi r^2 = SA(r,h)$

Lagrange multipliers

$\nabla S = \lambda \nabla V$

$S_r = 2\pi h + 4\pi r \qquad V_r = 2\pi r h$

$S_h = 2\pi r + 0 \qquad V_h = \pi r^2$

$2\cancel{\pi} h + 4\cancel{\pi} r = \lambda 2\cancel{\pi} r h \quad \& \quad 2\cancel{\pi}\cancel{r} = \lambda \cancel{\pi} r^{\cancel{2}}$

$2h + 4r = \lambda r h 2 \qquad 2 = \lambda r$

$$\left.\begin{aligned} 2h+4r &= \lambda r h 2 \\ 2 &= \lambda r \\ r^2 h &= 16 \end{aligned}\right\}$$ System of equations.

$\lambda = 2/r \rightarrow$ $$\left.\begin{aligned} 2h + 4r &= \left(\tfrac{2}{\cancel{r}}\right)\cancel{r} h 2 \\ r^2 h &= 16 \end{aligned}\right\}$$ New system

$2h + 4r = 4h$

$4r = 2h$

$2r = h \qquad r^2(2r) = 16$

$r^3 = 8$

$\boxed{r = 2 \quad h = 4}$