May 2, 2007

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$f(x, y) = 12xy - x^3 - 36y^2$

Find critical points

$f_x = 12y - 3x^2$

$f_y = 12x - 72y$

$12y - 3x^2 = 0$

$12x - 72y = 0 \Rightarrow x = 6y$

$12y - 3(6y)^2 = 0$

$12y - 108y^2 = 0$

$12y(1 - 9y) = 0$

$y = 0 \qquad y = \frac{1}{9}$

$x = 0 \qquad x = 6\left(\frac{1}{9}\right) = \frac{2}{3}$

What are these?

$D(x, y) = f_{xx}f_{yy} - (f_{xy})^2$

$f_{xx} = -6x \qquad f_{yy} = -72 \qquad f_{xy} = 12$

$D(x, y) = (-6x)(-72) - (12)^2 = 432x - 144$

At (0, 0), $D(0, 0) = -144$

saddle point

At $\left(\frac{2}{3}, \frac{1}{9}\right)$, $D\left(\frac{2}{3}, \frac{1}{9}\right) = 432\left(\frac{2}{3}\right) - 144 = +144$

$f_{xx}\left(\frac{2}{3}, \frac{1}{9}\right) = -6\left(\frac{2}{3}\right) = -4$

relative max

Test #2, Problem 4

$$\int_1^\infty \frac{1}{x^{1.5}}\,dx = \lim_{b\to\infty}\int_1^b x^{-1.5}\,dx = \lim_{b\to\infty}\left[\frac{1}{-0.5}x^{-0.5}\right]_1^b = \lim_{b\to\infty}\left[\frac{-2}{x^{0.5}}\right]_1^b$$

$$= \lim_{b\to\infty}\left[\frac{-2}{b^{0.5}} - \frac{-2}{1^{0.5}}\right] = \lim_{b\to\infty}\left[\frac{-2}{\sqrt{b}} - \frac{-2}{1^{0.5}}\right] = 0 + 2 = 2$$

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Random Variable x	0	1	2	3	4	5
P(X = x)	0.20	0.10	0.05	0.15	0.18	0.32

(b) $P(X = 0) = 0.2$ (c) $P(X \leq 2) = 0.2 + 0.10 + 0.05 = 0.35$
(d) $P(X \geq 2) = 0.05 + 0.15 + 0.18 + 0.32 = 0.7$