Brief Article

The Author

October 29, 2004

=3 December 3, 1997 **Math 108, Exam 3** This exam is worth a total of 100 points. There are 11 problem
and 3 partial credit. Each multiple choice problem is worth 7
are assigned next to the partial credit problems. Please show al
credit section of the test inside the test booklet. Use the front
multiple choice section by putting a $\boxed{\times}$ in the appropriate box
9:20am to complete the exam. Good luck!

Sign your name

6=2.5in =0.8cm =1cm =0.4cm=1

Find the value of k which makes $f(x) = 3x^2 + kx$ a probability density function on the interval $0 \leq x \leq 2$.

$k = \frac{3}{2}$ $k = \frac{-5}{8}$ $k = \frac{-7}{2}$ $k = 2$ $k = -3$

It is given that $(3, 3)$ is a critical point of a function $f(x, y)$. If $f(x, y)$=6, $f(x, y) = 6y$ and $f(x, y) = -6$, then what can be said of $(3, 3)$?

$(3, 3)$ is a relative minimum. $(3, 3)$ is a relative maximum. $(3, 3)$ is a saddle point. The test is inconclusive. There is not enough information to determine this.

Suppose that the amount of time required to serve a customer at a bank has an exponential density function with $\mu = 5$. What is the probability that the customer will be served in one minute or less? (i.e. determine $P(0 \leq X \leq 1)$.)

$e^{\frac{-1}{5}}$ $1 + e^{\frac{-1}{5}}$ $1 - e^{\frac{-1}{5}}$ $\frac{1}{5}e^{\frac{-1}{5}}$ $1 - \frac{1}{5}e^{\frac{-1}{5}}$

Find the equation of the plane which has x-intercept (3,0,0), y-intercept (0,-2,0) and z-intercept (0,0,6).

$z = 6 - 3x + 2y$ $z = 6 - 2x + 3y$ $z = 6 + \frac{1}{2}x - \frac{1}{3}y$ $z = 6 - \frac{1}{2}x + \frac{1}{3}y$ $z = 6 + 3x - 2y$

Consider the following probability table.

Outcome	0	1	2	3	4	5
Probability	$\frac{1}{9}$	$\frac{1}{18}$	$\frac{1}{6}$	$\frac{5}{18}$	$\frac{2}{9}$	$\frac{1}{6}$

What is the expected value E(X)?

$\frac{31}{57}$ $\frac{55}{18}$ $\frac{1200}{104976}$ $\frac{152}{74}$ $\frac{53}{18}$

Determine the cumulative distribution function for the probability density function $f(x) = \frac{3\sqrt{x}}{16}$ for $0 \leq x \leq 4$.

$F(x) = \frac{3}{16}x^{\frac{1}{2}}$ $F(x) = \frac{3}{32}x^{\frac{-1}{2}}$ $F(x) = \frac{1}{8}x^{\frac{3}{2}}$ $F(x) = \frac{1}{12}x^2$ $F(x) = \frac{1}{3}x^{\frac{-1}{2}}$

Compute f for the function $f(x, y) = x^2ye^{2xy - x^3}$.

$2xye^{2xy-x^3} + x^2y(2y - 3x^2)(e^{2xy-x^3})$ $2xye^{2xy-x^3} + x^2ye^{2xy-x^3}$ $2xye^{2xy-x^3}(2y - 3x^2)$ $2xy + (2y - 3x^2)(e^{2xy-x^3})$ $2xye^{2xy-x^3}$

The time in minutes required to complete an assembly on a production line is a random variable X with probability density function $f(x) = 2x$ for $0 \leq x \leq 1$. It is given that $E(X) = \mu = \frac{2}{3}$. Compute the variance Var(X).

$\frac{1}{9}$ $\frac{4}{9}$ $\frac{2}{13}$ $\frac{1}{3\sqrt{2}}$ $\frac{1}{18}$

Find the critical points of the function $f(x, y) = x^2 + 4xy + 2y^4$ and determine whether they are relative maxima, relative minima, or saddle points. (Hint: You should find three critical points.) (22 points)

What would be your prediction for the profits for the fourth year?

A company determines that its production function is given by $f(x, y) = 72x^{\frac{1}{4}}y^{\frac{3}{4}}$ where x is the amount of capital and y is the amount of labor. Suppose capital costs \$9 per unit and labor costs \$18 per unit. The company has a budget of \$12,000. Find the amounts of labor and capital which will maximize the company's production while keeping within the constraints of the bud-

Suppose that you are being asked to analyze the income for a company whose total profit fits into the following chart.

Year	1	2	3
Profit	2	5	7

What is the regression line for these data points? (Use the least squares method.) (22 points) get. (22 points)