

**Math 115 (Powers) 1½ Hour Test. Thursday February 23, 2006**

Name(print) \_\_\_\_\_ Penn I.D. \_\_\_\_\_

Signature \_\_\_\_\_ e.g. 10101234

Circle your answers.

A correct answer without supporting work will be given little or no credit.

1. Consider the surface  $z = 2x^2 + y^2$ . Find the plane tangent to the surface at  $(x,y,z) = (1,3,11)$  and determine where the plane intersects the  $z$ -axis. The tangent plane intersects the  $z$ -axis at  $z =$

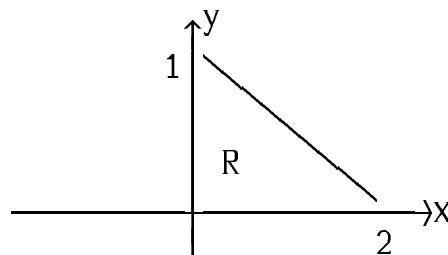
- A. 0   B. -2   C. -6   D. -7   E. -11   F. -12   G. -22   H. 4  
##

2. Suppose A, B and C are three mutually independent events and  $\Pr(A) = 2/3$ ,  $\Pr(B) = \frac{1}{2}$  and  $\Pr(C) = \frac{1}{3}$ . What is the probability that exactly one events occurs?

- A. 0   B.  $\frac{1}{18}$    C.  $\frac{1}{9}$    D.  $\frac{1}{6}$    E.  $\frac{2}{9}$    F.  $\frac{5}{18}$    G.  $\frac{1}{3}$    H.  $\frac{7}{18}$   
##

3. Let R be the region inside the triangle with vertices  $(x=0,y=0)$ ,  $(x=2,y=0)$  and  $(x=0,y=1)$ .

Let  $f(x,y) = 2x$ . Then  $\iint_R f(x,y) dA$



- A. 0   B. 1/3   C. 2   D. 1   E. 1/2   F. 1/6   G. 2/3   H. 4/3  
##

4. If four people sit down at random in row containing seven seats. What is the probability that all four people will be sitting in adjacent seat?

- A. 2/35   B. 4/35   C. 1/7   D. 1/6   E. 1/3   F. 19/35   G. 4/7   H. 3/5  
##

5. Find the point(s) on the ellipse  $4x^2 + 9y^2 = 36$  closest to the point  $(x = 2, y = 0)$ . The  $x$  coordinate of the closest point(s) is

- A. 0   B. ½   C. 1   D. 3/2   E. 3   F. 9/5   G. 18/5   H. 4  
##

6. Of 100 students in a class, 30 speak Italian, 50 speak Spanish and 40 speak French, 10 speak Spanish and Italian, 20 speak Spanish and French and 15 speak Italian and French. Five students speak all three languages. What is the probability that a randomly chosen student speaks none of these languages.

- A. 0 B.  $\frac{5}{100}$  C.  $\frac{10}{100}$  D.  $\frac{15}{100}$  E.  $\frac{20}{100}$  F.  $\frac{25}{100}$  G.  $\frac{30}{100}$  H.  $\frac{35}{100}$   
##

7. Three fair dice numbered 1,2,3,4,5 and 6 are tossed. What is the probability that all the three dice show a different number?

- A.  $\frac{1}{2}$  B.  $\frac{1}{3}$  C.  $\frac{4}{9}$  D.  $\frac{17}{36}$  E.  $\frac{1}{4}$  F.  $\frac{5}{9}$  G.  $\frac{11}{36}$  H.  $\frac{1}{5}$   
##

8. Three fair dice numbered 1,2,3,4,5,6 are tossed and the sum is found to be six. What is the probability that none of the dice is a one? (Hint list all the ways the dice can add up to six.)

- A. 0 B.  $\frac{1}{20}$  C.  $\frac{1}{18}$  D.  $\frac{1}{10}$  E.  $\frac{1}{6}$  F.  $\frac{1}{5}$  G.  $\frac{3}{10}$  H.  $\frac{1}{3}$   
##

9. Lemons are acquired from three sources A,B and C. It is known that 1% of type A lemons are green, 2% of type B lemons are green and 3% of type C lemons are green. A mixture of 30% type A lemons, 30% type B lemons and 40% type C lemons is shipped to Super Saver Markets. A green lemon is found in the mixture. What is the probability that it is of type A?

- A.  $\frac{1}{7}$  B.  $\frac{1}{3}$  C.  $\frac{2}{5}$  D.  $\frac{3}{7}$  E.  $\frac{1}{2}$  F.  $\frac{3}{5}$   
##  
G.  $\frac{4}{5}$  H.  $\frac{3}{10}$

	% green	% in mixture
A	1	30
B	2	30
C	3	40

10. A jar contains 6 red balls and 4 green balls. If 5 balls are randomly drawn out of the jar without replacement. What is the probability that there are more red balls than green balls drawn?

- A.  $\frac{39}{61}$  B.  $\frac{555}{793}$  C.  $\frac{51}{133}$  D.  $\frac{31}{42}$  E.  $\frac{1}{2}$  F.  $\frac{2}{3}$  G.  $\frac{53}{64}$  H.  $\frac{11}{12}$   
##

11. Twelve cards numbered 1-12 are randomly distributed to 3 players so that each player has 4 cards. What is the probability that one player has the three lowest cards 1,2 and 3. Probability =

- A.  $3/11$  B.  $3/55$  C.  $4/9$  D.  $1/11$  E.  $13/55$  F.  $17/55$  G.  $1/2$  H.  $1/12$   
##

12. There are three coins A, B, and C. Coin A has lands heads  $1/4$  of the time, coin B lands heads  $1/2$  the time and coin C lands heads  $3/4$ . A coin is selected at random and is flipped three times. It lands heads on the first and second flip and lands tails on the third flip. Which coin is it most likely to be and what is the probability it is that coin?

- |  |       |       |       |     |    |     |         |
|--|-------|-------|-------|-----|----|-----|---------|
|  |       |       |       |     |    |     |         |
|  |       | ##    |       |     |    |     |         |
|  | $1/4$ | $1/2$ | $3/4$ |     |    |     |         |
| circle most probable coin                  | A.    | B.    | C.    |     |    |     |         |
| Probability most probable coin is choosen. |       |       |       | 50% | ## | 45% | 40% 30% |

13. Six different pairs of socks (red, blue, gray, white, green, yellow) go to the laundry (12 socks in all) and 8 come back. What is the probability that all 8 socks that come back are paired? An example of all socks paired is (2 red, 2 blue, 2 gray and 2 white).

- A.  $1/2$  B.  $1/3$  C.  $2/11$  D.  $1/18$  E.  $1/33$  F.  $1/40$  G.  $1/52$  H.  $1/72$   
##

14. Six different pairs of socks (red, blue, gray, white, green, yellow) go to the laundry (12 socks in all) and 8 come back. What is the expected number of pairs of socks that come back? (Hint, What is the expected number of pairs of red socks that come back? What is the expected number of pairs of blue socks? .... ) Expected number of pairs of socks that come back =

- A.  $9/4$  B.  $8/3$  C. 2 D.  $7/3$  E.  $21/11$  F.  $25/11$  G.  $28/11$  H. 3  
##