2/23/05 QUIZZ NR 3 **Math118, O.Knill**

Name:

1) One of the following maps is an area preserving Henon map. Which one?

a) $T(x,y) = (3(1-x^2) - y, 2x)$
b) $T(x,y) = (2x - y + \sin(x), x)$.
c) $T(x,y) = (2x - y + \sin(x), x/2)$.
d) $T(x,y) = (3(1-x^2) - y, x)$

2) For a certain parameters c, the Standard map $T(x,y) = (2x + c\sin(x) - y, x)$ mod 1 is integrable. Which integral verifies this fact?

a) $F(x,y) = x - y$.
b) $F(x,y) = x$
c) $F(x,y) = x^2 + y^2$.
d) $F(x,y) = 1$.

3) Which of the following matrices is the Jacobean matrix of the transformation $T(x,y) = \begin{bmatrix} (x^2+y^2)/2 \\ 2x^2 - y^2 \end{bmatrix}$?

a) $DT(x,y) = \begin{bmatrix} x & y \\ 4x & -2y \end{bmatrix}$.

b) $DT(x,y) = \begin{bmatrix} x^2/2 & y^2/2 \\ 2x^2 & -y^2 \end{bmatrix}$.

4) The map T of the previous problem is area preserving.

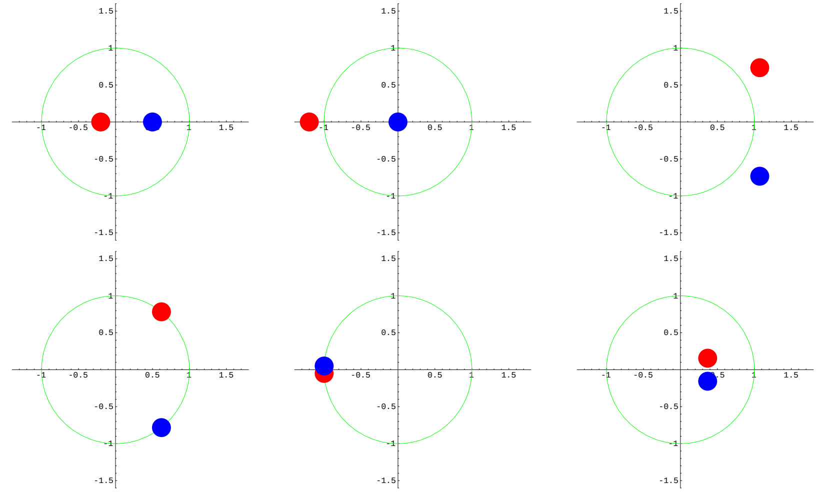
c) True

d) False

5) A map in the plane is called an **involution** if $T^2 = Id$, that is if every point is periodic with period 2. Which of the following statements are true?

a) In general, an involution is integrable.
b) The map $T(x,y) = (-x, y + c\sin(x))$ is an involution.
c) All linear involutions are area-preserving.
d) The map $T(x,y) = \begin{cases} (-x/2, y) & x > 0 \\ (-2x, y) & x < 0 \end{cases}$ is an involution.
e) In general, an involution is area preserving.

6) Which of the following 6 pictures shows the eigenvalues of a Jacobean at a fixed point with stable and unstable manifolds:



7) If the stable and unstable manifolds of a hyperbolic fixed point (x_0, y_0) of intersect transversely, then this intersection point is called

a) an equilibrium point
b) an integral
c) a homoclinic point
d) a periodic point
e) a horse shoe

8) Which of the following facts are true about the Henon attractor, obtained with parameters $a = 1.4, b = 0.3$?

a) It contains the stable manifold of one of the hyperbolic fixed points.
b) It contains a horse shoe.
c) It contains infinitely many periodic points.
d) It is integrable.