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Second Exam MTH 211 Fall 2010

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QUESTION 1. (i) To tile a floor, we may use pieces of a regular 12-gon with pieces of one of the following regular n-gon :

a) regular 4-gon b) regular 6-gon c) regular 5-gon d) regular 3-gon.

(ii) To tile a floor, we may use pieces of regular 12-gon with:

a) pieces of regular 6-gon and pieces of regular 3-gon b) nothing else (only pieces of regular 12-gon) c) pieces of regular 6-gon and pieces of regular 4-gon. d) pieces of regular 4-gon and pieces of regular 8-gon

(iii) To a tile a floor, we may use pieces of regular 8-gon with:

a) pieces of regular 3-gon b) pieces of regular 4-gon c) pieces of regular 12-gon d) nothing else (only pieces of regular 8-gon)

(iv) One of the following shapes can be used to a tile a floor (Escher-tiling or Free-tiling):

(v) Let $f : R^2 \longrightarrow R^2$ such that $f(z) = 4z$ where $z = (x, y)$ is a point in R^2. Then f((3, 2)) =

a)(12, 8) b)(3, 8) c)(12, 2) d)(6, 4)

(vi) The above function f is :

a) Rotation and stretching b) central similarity of the plane c) Reflection about y-axis and stretching d) Reflection about x-axis and stretching

(vii) The stretching factor (ratio-constant) of f (above) is :

a) 1/4 b) varies we can not determine it c) 4 d) $\sqrt{4}$

(viii) Let S be a square in the plane such that the area of $S = 100$. Then the area of $f(S)$ is (the same f above, note $f(S)$ means the image of S under f):

a)400 b) $\sqrt{400} = 20$ c) 100 d) 1600

(ix) Let K_n be a sequence such that $K_1 = 2$, $K_2 = 10$, and $K_n = 2K_{n-1} + 3K_{n-2}$ for each $n \geq 3$. Then $K_4 =$

a) 12 b) 34 c) 44 d) 82

(x) The general formula for K_n is :

a) $3^n - 1$ b) $3^n + 1$ c) $3^n + (-1)^n$ d) $2^n - 5(10^n)$

(xi) Let $R_n = K_{n+1}/K_n$. Then R_n is the ratio sequence of K_n. The R_n (when n is so huge , n reaches infinity) converges to:

a)2 b) 3 c) -1 d) 10

(xii) Let $F_1 = 1$, $F_2 = 1$, and $F_n = F_{n-1} + F_{n-2}$. Then we know F_n is the Fibonacci sequence. Now when n is so huge, we know that the ratio F_{n+1}/F_n converges to :

a) $\frac{1+\sqrt{5}}{2}$ b) $\frac{\sqrt{5}-1}{2}$ c) 1 d) $\sqrt{1+1} = \sqrt{2}$

(xiii) Let $h : R^2 \longrightarrow R^2$ such that $h(z) = (3,3).z$. Then $h((3,3)) =$

a) (0, 18) b) (0, 9) c) (9, 9) d)(0, $\sqrt{18}$)

(xiv) The angle of rotation of the above h is :

a)90 b) 45 c) 180 d) 30

(xv) The stretching factor of h above is :

a)3 b) 9 c) $\sqrt{18}$ d) 18

(xvi) Let C be a circle in the plane with area equals 4π. We know that $h(C)$ is a circle too. The area of $h(C)$ is

a)18π b) $4\sqrt{18}\pi$ c) 12π d) 72π

(TAKE HOME PART II: Each question = 12 points. THIS IS NOT A GROUP WORK. PLEASE PLEASE DO YOUR OWN WORK. DUE TIME: ANY TIME between 12 noon Tuesday and noon Wed Jan 5, 2011, YOU MAY USE SEPARATE PAGE FOR EACH QUESTION)

QUESTION 2. Construct the inversion of abc with respect to the circle C

QUESTION 3. Construct the inversion of the below objects with respect to C.

QUESTION 4. Construct the inversion of the below objects with respect to C.

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