Math Screening

This will be a graded assessment to test that you have the math knowledge required to complete this project as this project requires at least an undergraduate level understanding of math problems. You must get at least 4 out of 5 questions correct to task on this project. Thank you!

Which of the following gives the volume obtained by rotating the region bounded by y = x^2 and y = 4 about the y-axis?

- \int_0^2 \pi * x^2 dx
- \int_0^4 \pi * y dy ✓
- \int_0^2 \pi * x^4 dx
- \int_0^4 \pi * y^2 dy

Correct!

Set E_1 = 3 and define E_n = 3^E_{n-1}. What is the unit digit on E_1001?

- 1
- 3
- 5
- 7 ✓
- 9

Correct!

You walk \pi/5 radians around a circular lake with radius 1 from point A to point B. Let C be any point on the circle not along the path walked between A and B. What is the measure of angle ACB?

- Depends on the position of C
- \pi/5
- 2\pi/5
- \pi/10 ✓

Correct!

Recall that a rook in chess attacks along rows and columns. Define R_n to be the number of ways of arranging n rooks on an n x n chess board so that no two can attack each other and their placement is symmetric about the diagonal from lower left to upper right. Which is a correct formula for R_n?

- R_n = n!/2
- R_n = n(n-1)/2
- R_n = R_{n-1} + (n-1)*R_{n-2} ✓
- R_n = n*R_{n-1} + (n-1)*R_{n-2}

Correct!

Consider the vector space V of all polynomials over the complex numbers with degree at most n. Let T:V \to V be a surjective linear transformation. Which of the following are true:

- T has a zero eigenvalue
- T has a nonzero eigenvalue ✓
- Det T = 0
- Det T != 0 ✓

Correct!

Consider the subset of the real line A = (-inf, 0]. Which of the following are open sets (there may be more than 1 correct answer)?

- A \cap [0,1]
- A \cap (-inf,-1) ✓
- A \cup {½}
- A \cup (-1,1) ✓
- A \cup (0.1,1)

Correct!