Test #3 (Part 2, Scientific Calculator Okay) Name: _____

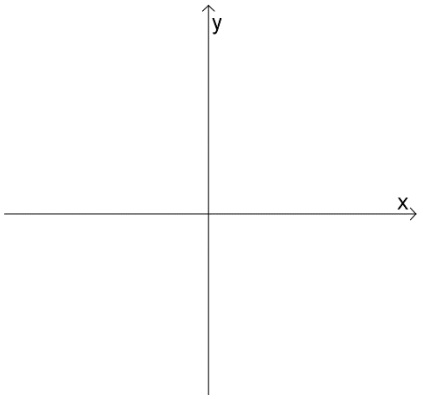
Math 181, Prof. Beydler Wednesday, November 28, 2018

Directions: Show all work. No books or notes. A **scientific calculator** is allowed. Your desk and lap must be clear (no phones, no smart watches, etc.). If you have a phone in your lap or on your chair, it is considered cheating, and you will receive a zero on this test. Write your answers in the indicated places, or box your answers. Good luck!

1. (3 points) Given the following parametric equations/intervals of a particle in the xy-plane, find the related Cartesian equation and graph it. Then, indicate the portion of the graph traced by the particle and the direction of motion.

   $x = 3\sin t\,,\ y = 2\cos t\,,\ 0 \le t \le \pi$

Cartesian equation of curve: _____



2. (4 points) Find the length of the curve $x = \cos^3 t\,,\ y = \sin^3 t\,,\ 0 \le t \le \frac{\pi}{2}$

Answer: _____

3. Set up but do not evaluate (an) integral(s) to find the area of the region…

a. (4 points) …inside $r = 3\cos\theta$ and outside $r = 1 + \cos\theta$.

Answer: _____

b. (4 points) …inside both $r = 4\sin\theta$ and $r = 2$.

Answer: _____

4. (4 points) Find the length of the curve $r = \theta^2$, $0 \leq \theta \leq 2\pi$. Leave your answer in exact form.

Answer: _____

5. (6 points) Find the values of θ in $[0,2\pi)$ where the tangent line of $r = 1 + \cos\ \theta$ is horizontal or vertical.

Horizontal when $\theta =$ _____

Vertical when $\theta =$ _____

6. (3 points) Assume that the following sequence converges and find its limit.

$a_1 = 1, \quad a_{n+1} = \sqrt{2a_n + 3}$

Answer: _____

7. Determine whether each series is convergent or divergent. If it converges, find its sum.

a. (3 points) $\sum_{n=0}^{\infty} \frac{(-2)^n}{e^{n+1}}$

Convergent or divergent (circle one)

Sum (if it converges): _____

b. (4 points) $\sum_{n=1}^{\infty} \frac{2}{(n+1)(n+3)}$

Convergent or divergent (circle one)

Sum (if it converges): _____

8. Use $\sum_{n=1}^{\infty} \frac{1}{n^2}$ to answer the parts below.

a. (3 points) How many terms are needed to make sure that the sum is accurate to within 0.0005?

Answer: _____

b. (3 points) Use 3 with $n = 4$ to give an estimate of the series' sum that's better than s_4.

Here's formula 3: $\boldsymbol{s_n + \int_{n+1}^{\infty} f(x)\,dx \le \sum a_n \le s_n + \int_n^{\infty} f(x)\,dx}$

Answer: _____

9. (2 points) Find the sum of the series $\sum_{n=1}^{\infty} \frac{(-1)^n}{2^n n!}$ correct to 4 decimal places.

Answer: _____

Here are the two integrals I promised in case you need them:

$$\int \sec x \, dx = \ln|\sec x + \tan x| + C$$

$$\int \csc x \, dx = -\ln|\csc x + \cot x| + C$$