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MATH 172

EXAM 3

Fall 1999

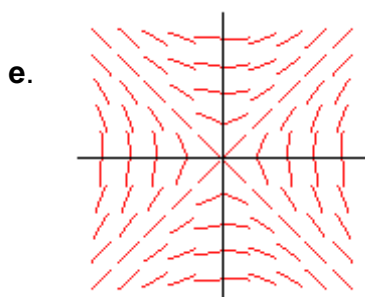
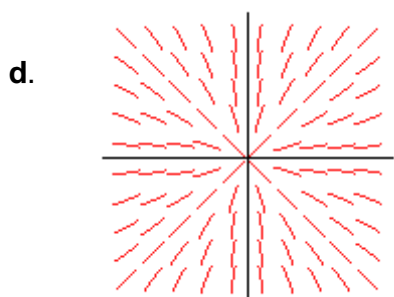
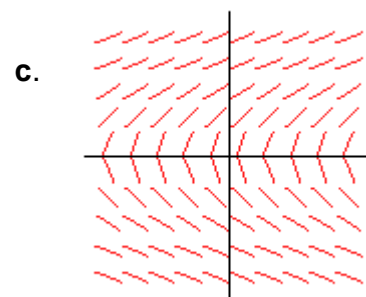
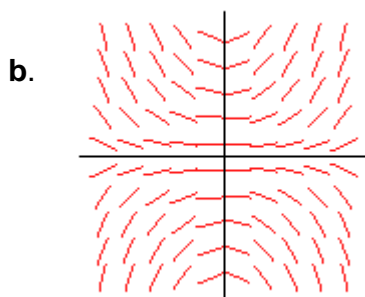
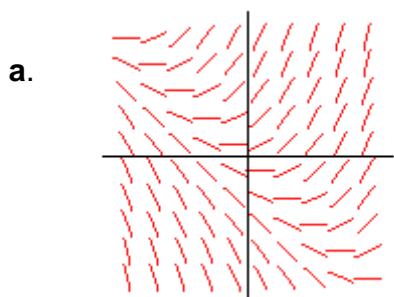
Section 502

P. Yasskin

1-10	/80
11	/15
12	/15

Multiple Choice: (8 points each)

1. Which of the following is the direction field of the differential equation $\frac{dy}{dx} = xy$?



2. The limit $\lim_{n \rightarrow \infty} \frac{4(2)^n}{(5)^n}$

- a. converges to 0.
- b. converges to $\frac{4}{1 - \frac{2}{5}}$.
- c. converges to 4.
- d. converges to $\frac{\frac{8}{5}}{1 - \frac{2}{5}}$.
- e. diverges.

3. $\lim_{n \rightarrow \infty} \left(1 - \frac{1}{n^2}\right)^{3n^2} =$

- a. e^{-6}
- b. e^6
- c. 1
- d. e
- e. e^{-3}

4. The series $\sum_{n=1}^{\infty} \frac{(-1)^{n+1} 2^n}{3^n}$

- a. diverges by the n^{th} -Term Test.
- b. converges to 2
- c. converges to $\frac{2}{5}$
- d. converges to $-\frac{3}{5}$
- e. diverges by the Alternating Series Test

5. $\sum_{n=1}^{\infty} \left(\frac{n+1}{n} - \frac{n+2}{n+1} \right) =$

- a. 0
- b. 1
- c. 2
- d. 3
- e. ∞

6. The series $\sum_{n=1}^{\infty} \frac{n!}{2^n}$

- a. converges by the Integral Test.
- b. diverges by the Integral Test.
- c. converges by the Ratio Test.
- d. diverges by the Ratio Test.
- e. converges by Comparison with $\sum_{n=1}^{\infty} \frac{1}{2^n}$.

7. The series $\sum_{n=2}^{\infty} \frac{2}{n^3 + \sqrt{n}}$

- a. diverges by the n^{th} -Term Test.
- b. converges by the Ratio Test.
- c. diverges by the Ratio Test.
- d. converges by Comparison to $\sum_{n=2}^{\infty} \frac{2}{n^3}$
- e. diverges by Comparison to $\sum_{n=2}^{\infty} \frac{2}{\sqrt{n}}$

8. The series $\sum_{n=2}^{\infty} \frac{1}{\sqrt{n+1}}$

- a. converges by the Integral Test.
- b. diverges by the Integral Test.
- c. converges by the Ratio Test.
- d. diverges by the Ratio Test.
- e. diverges by the n^{th} -Term Test.

9. The series $\sum_{n=1}^{\infty} \frac{(-1)^n}{\sqrt{n+1}}$ is

- a. Absolutely Convergent
- b. Conditionally Convergent
- c. Convergent for Even n , Divergent for Odd n
- d. Convergent for Odd n , Divergent for Even n
- e. Divergent

10. The series $\sum_{n=1}^{\infty} \frac{(-1)^n}{n^{3/2}}$ is

- a. Absolutely Convergent
- b. Conditionally Convergent
- c. Convergent for Even n , Divergent for Odd n
- d. Convergent for Odd n , Divergent for Even n
- e. Divergent

11. (15 points) Solve the differential equation $\frac{1}{x} \frac{dy}{dx} + 3xy = e^{-x^3}$ with $y(0) = 2$

12. (15 points) A tank contains 5000 gal of water. Initially, there are 10 lb of salt dissolved in the water. Salt water containing 0.03 lb of salt per gal is added to the tank at the rate of 2 gal per hour. The solution is kept mixed and is drained at the rate of 2 gal per hour. Let $S(t)$ be the amount of salt in the tank at time t .
- State the differential equation and the initial condition satisfied by $S(t)$.

b. Solve this initial value problem.

c. At large times, what is the asymptotic amount of salt in the tank.