MA 162 Exam 3 Spring 2000

NAME _____

STUDENT ID _____

REC. INSTR. _____ REC. TIME. _____

INSTRUCTOR _____

INSTRUCTIONS:

1. Make sure that you have all 7 test pages.
2. Fill in the information requested above and on the answer sheet.
3. Mark the letter of your response for each question on the mark–sense answer sheet.
4. There are 11 problems worth 9 points each.
5. No books or notes or calculators may be used.

Some infinite series:

$$\ln(1+x) = \sum_{n=1}^{\infty} (-1)^{n-1} \frac{x^n}{n}$$

$$\tan^{-1} x = \sum_{n=0}^{\infty} (-1)^n \frac{x^{2n+1}}{2n+1}$$

$$(1+x)^s = \sum_{n=0}^{\infty} \binom{s}{n} x^n$$

1. For which x does the series $\sum_{n=1}^{\infty} \frac{(-1)^n x^n}{n^2 3^{n+1}}$ converge?

A. $-\frac{1}{3} < x < \frac{1}{3}$

B. $\frac{1}{3} \leq x \leq \frac{1}{3}$

C. $-3 \leq x < 3$

D. $-3 < x \leq 3$

E. $-3 \leq x \leq 3$

2. If the power series of $f(x)$ is $\sum_{n=1}^{\infty} \frac{2^{n-1} x^n}{n+2}$, what is $f^{(4)}(0)$?

A. $\frac{2}{9}$

B. $\frac{4}{3}$

C. 32

D. $\frac{1}{3}$

E. $\frac{16}{3}$

3. Find the first three nonzero terms for the power series of $f(x) = \dfrac{x}{1+3x^2}$.

A. $x - 3x^3 + 9x^5$

B. $2x + 9x^3 + 81x^5$

C. $\dfrac{1}{3}x - \dfrac{1}{9}x^2 - \dfrac{1}{27}x^3$

D. $\dfrac{1}{3}x - \dfrac{1}{9}x^3 + \dfrac{1}{27}x^5$

E. $1 - 3x^2 + 9x^4$

4. Find the first three terms of the power series for $f(x) = \dfrac{1}{\sqrt{1+2x}}$.

A. $1 - \dfrac{x}{2} + \dfrac{3x^2}{8}$

B. $1 + x - \dfrac{x^2}{2}$

C. $1 + \dfrac{x}{2} - \dfrac{x^2}{8}$

D. $1 - x + \dfrac{3x^2}{2}$

E. $1 - x - 3x^2$

5. Find the Taylor polynomial $p_3(x)$ about $a = 1$ for the function $f(x) = x^4 - 3x^2 + x + 1$.

A. $1 + (x-1) - 2(x-1)^2$

B. $-(x-1) + 6(x-1) + 24(x-1)^3$

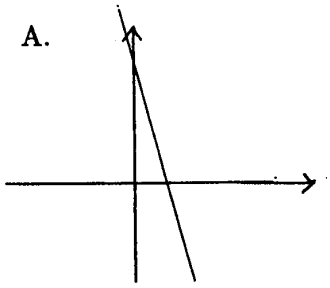
C. $1 + (x-1) - 4(x-1)^2$

D. $-(x-1) + 3(x-1)^2 + 4(x-1)^3$

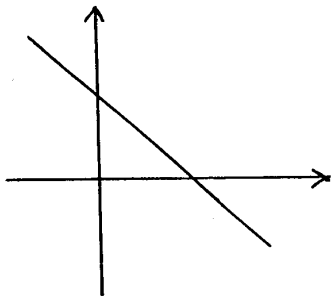
E. $-(x-1) + 3(x-1)^2 + 8(x-1)^3$

6. Which of the curves below is described by the parameter equations $x = 1 + 2t$, $y = 2 - 2t$.

A.



B.



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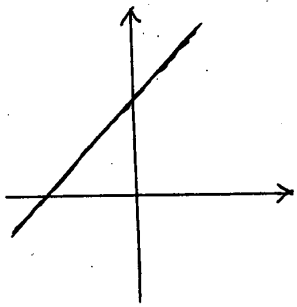
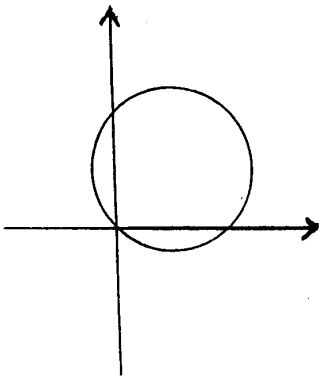
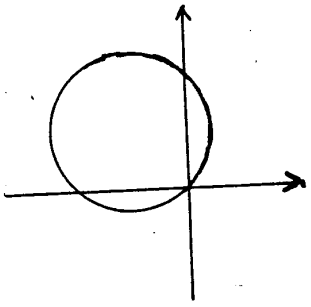


D.



E.



7. An object is moving in the plane. If its position at time t is $(1 - \cos^2 t, \sin 2t)$, then its velocity when $t = \frac{\pi}{4}$ is

A. $\frac{\sqrt{5}}{2}$

B. $\sqrt{\frac{3}{2}}$

C. $\frac{1}{2}$

D. $\frac{\sqrt{2}}{2}$

E. 1

8. The length of the curve $x = \frac{t^3}{3} - t$, $y = t^2$, $1 \leq t \leq 2$, is

A. $\frac{10}{3}$

B. $\frac{14}{3}$

C. $\frac{16}{5}$

D. $\frac{19}{5}$

E. 4

9. If the polar coordinates of a point are $\left(2, \frac{2\pi}{3}\right)$, then its Cartesian coordinates are

A. $(\sqrt{3}, 2\sqrt{3})$

B. $(-\sqrt{3}, 2)$

C. $(-1, \sqrt{3})$

D. $\left(\frac{1}{2}, \frac{3}{2}\right)$

E. $\left(1, -\frac{\sqrt{3}}{2}\right)$

10. If the polar equation of a curve is $2r\cos\theta = \tan\theta$, what is its Cartesian equation?

A. $x^2 + y = 1$

B. $2x^2y^2 = 1$

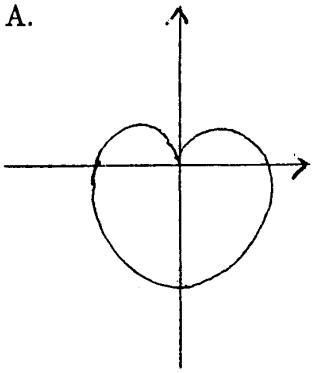
C. $xy = y^2 + 1$

D. $2x^2y = 1$

E. $y = 2x^2$

11. The equation $r = 3 + \sin\theta$ describes the curve

A.



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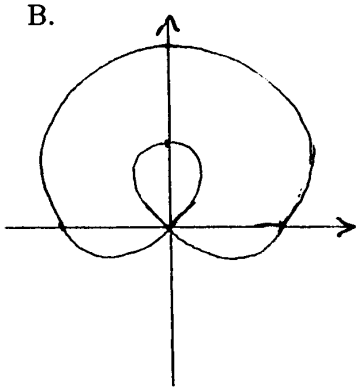

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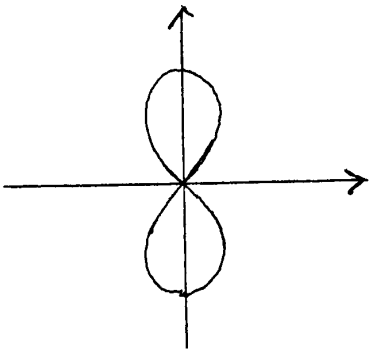
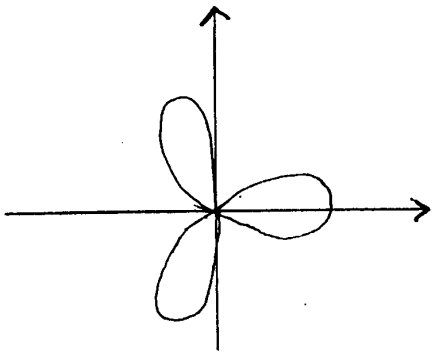


D.



E.