Exam 3A

Course ID:	**MAC 2312**
Course Title:	Calculus II
Date of Exam:	August 1st 2013
Duration of Exam:	90 minutes

Instructions

A. Sign your scantron sheet in the white area on the back in ink.

B. Write and code in the spaces indicated:

1) Name (last name, first name, middle initial)

2) UF ID number

3) Section number

C. Under "special code" code the test ID numbers 3 (1st row), 1 (2nd row).

1 2 • 4 5 6 7 8 9 0
• 2 3 4 5 6 7 8 9 0

D. Under "form code" code in A.

• B C D E

E. While taking the test, please keep your answer sheet covered or turned over at all times.

F. This test consists of 15 multiple choice questions and 4 free response questions. No calculators are allowed.

G. When you are finished:

1) Before turning in your test check for transcribing errors. No changes may be made after submitting your scantron.

2) You must turn in your scantron and tear off sheets to your instructor. Be prepared to show your picture ID with a legible signature.

3) The answers will be posted within one day after the exam.

The following questions are worth 6 points each.

1. Which of the following integrals evaluates the area enclosed by the curves

$$y = \sin(x); \quad y = \cos(x)$$

in the interval $0 \leq x \leq 2\pi$?

A. $\displaystyle\int_0^{\frac{\pi}{4}} \sin(x) - \cos(x)\ dx + \int_{\frac{\pi}{4}}^{\frac{5\pi}{4}} \cos(x) - \sin(x)\ dx + \int_{\frac{5\pi}{4}}^{2\pi} \sin(x) - \cos(x)\ dx$

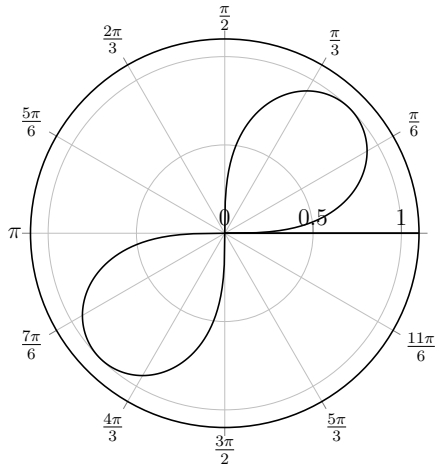
B. $\displaystyle\int_0^{\frac{\pi}{4}} \cos(x) - \sin(x)\ dx + \int_{\frac{\pi}{4}}^{\frac{5\pi}{4}} \sin(x) - \cos(x)\ dx + \int_{\frac{5\pi}{4}}^{2\pi} \cos(x) - \sin(x)\ dx$

C. $\displaystyle\int_0^{\frac{\pi}{4}} \cos(x) - \sin(x)\ dx + \int_{\frac{\pi}{4}}^{2\pi} \sin(x) - \cos(x)\ dx$

D. $\displaystyle\int_0^{\frac{\pi}{4}} \sin(x) - \cos(x)\ dx + \int_{\frac{\pi}{4}}^{2\pi} \cos(x) - \sin(x)\ dx$

E. $\displaystyle\int_0^{2\pi} \sin(x) - \cos(x)\ dx$

2. Find the area enclosed by the graph of $r^2 = \sin(2\theta)$.



A. $\dfrac{\pi}{2}$ B. $\dfrac{1}{2}$ C. 1 D. $\dfrac{\pi}{3}$ E. $\dfrac{\pi}{4}$

3. Find the equation of the tangent line (in cartesian coordinates) to the polar equation $r = 2\cos(\theta)$ at the point when $\theta = \dfrac{\pi}{4}$.

A. $y = \dfrac{3}{4}x + \dfrac{1}{4}$ B. $y = \dfrac{5}{4}x - \dfrac{1}{4}$ C. $y = \dfrac{1}{3}x + \dfrac{2}{3}$

D. $y = \dfrac{1}{2}x + \dfrac{1}{2}$ E. $y = 1$

4. Using the method of cylindrical shells, which of the following integrals represents the volume obtained when the region bounded by $y = 2x^2 - x^3$ and the x-axis is rotated around the y-axis?

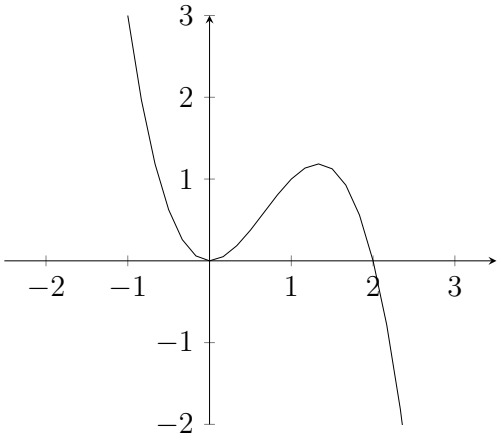
A. $V = 2\pi \displaystyle\int_0^2 2x^2 - x^3 \, dx$

B. $V = 2\pi \displaystyle\int_0^2 2x^3 - x^4 \, dx$

C. $V = \displaystyle\int_0^2 2x^3 - x^4 \, dx$

D. $V = \displaystyle\int_0^2 2x^2 - x^3 \, dx$

E. $V = 2\pi \displaystyle\int_0^1 2x^3 - x^4 \, dx$

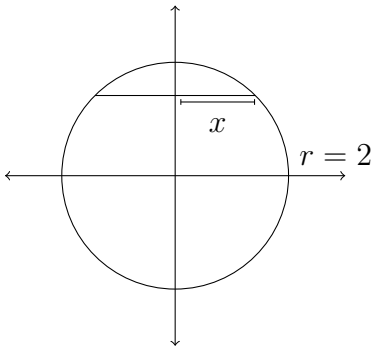


5. Over which interval(s) is/are the curve defined by $x = \dfrac{1}{2}t^2 + 1$ and $y = \dfrac{1}{3}t^3 + \dfrac{1}{2}t^2$ concave up?

A. $(-1, 0)$ and $(1, \infty)$ B. $(-\infty, -1)$ and $(0, 1)$ C. $(-\infty, 0)$

D. $(0, \infty)$ E. $(-\infty, 0)$ and $(1, \infty)$

6. Find the volume of the solid whose base is a disc of radius 2 and whose perpendicular cross sections are squares.



A. $A = \int_0^2 4(4 - y^2)\ dy$

B. $A = 2\int_0^2 4(4 - y^2)\ dy$

C. $A = 2\int_0^2 (4 - y^2)\ dy$

D. $A = 2\int_0^2 2(4 - y^2)\ dy$

E. $A = 2\int_0^2 \sqrt{2(4 - y^2)}\ dy$

7. Use the washer method to find the volume generated by rotating the area bounded by $y = \sqrt{x}$ and $y = x^3$ around the x-axis.

A. $\pi\left(\frac{1}{2} - \frac{4}{9} + \frac{1}{7}\right)$ B. $\pi\left(\frac{1}{7} - \frac{1}{2}\right)$ C. $\pi\left(\frac{4}{9} - \frac{1}{2} - \frac{1}{7}\right)$

D. $\pi\left(\frac{1}{2} - \frac{1}{7}\right)$ E. $\pi\left(\frac{2}{3} - \frac{1}{4}\right)$

8. Find $\dfrac{dy}{dx}$ of the given parametric curve.

$$x = \cos(t); \quad y = \sin(t)$$

A. $\cot(t)$ B. $-\cot(t)$ C. $\tan(t)$ D. $-\tan(t)$ E. 1

9. For which t does the parametric curve defined by $x = e^t - t$ and $y = t^3 - 3t$ have a horizontal tangent line? A vertical tangent line?

A. VTL: $t = 0$; HTL: $t = \sqrt{3},\ -\sqrt{3}$.

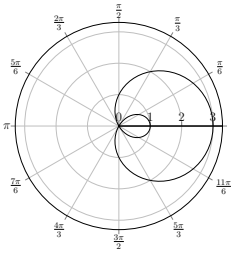
B. VTL: $t = 1,\ -1$; HTL: $t = 0$.

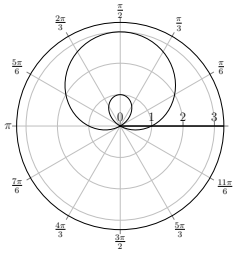
C. VTL: $t = 0$; HTL: $t = 1,\ -1$.

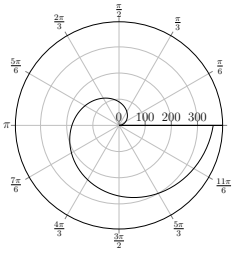
D. VTL: $t = \sqrt{3},\ -\sqrt{3}$; HTL: $t = 0$.

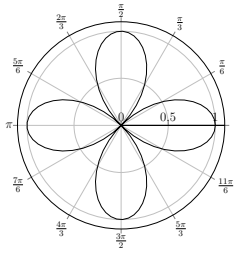
E. VTL: $t = \sqrt{3},\ -\sqrt{3}$; HTL: $t = 1$.

10. Which of the following is the correct graph for $r = 1 + 2\cos(\theta)$?

A. 

B. 

C. 

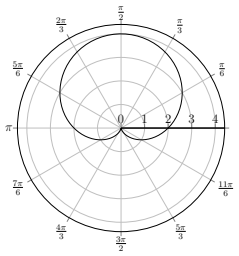
D. 

Bonus Questions: Match each equation to its graph.

The following questions are worth 2 points each.

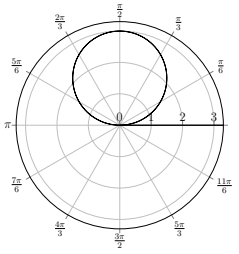
11. $r = 2\sin(5\theta)$

A.



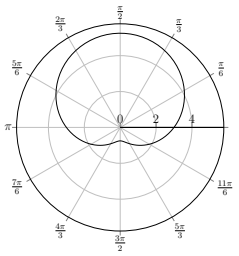
12. $r = 1 + 2\sin(\theta)$

B.



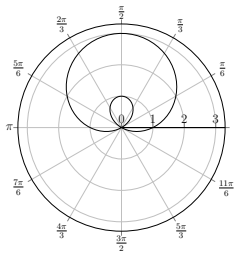
13. $r = 3 + 2\sin(\theta)$

C.



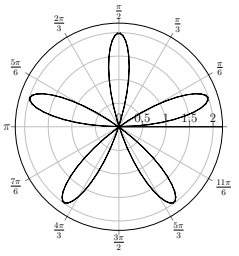
14. $r = 2 + 2\sin(\theta)$

D.



15. $r = 3\sin(\theta)$

E.



MAC2312 **Name:**_____

Exam 3A **Section:**_____

Instructions: You must show all work to receive full credit.

1. Consider the following equations.

$$f(x) = x$$

$$g(x) = -x^2 + 2x$$

Find the volume of the solid obtained when the region bounded by the above functions is rotated about the x-axis.

2. Find the length of the following parametric curve over the interval $[0, 3]$.

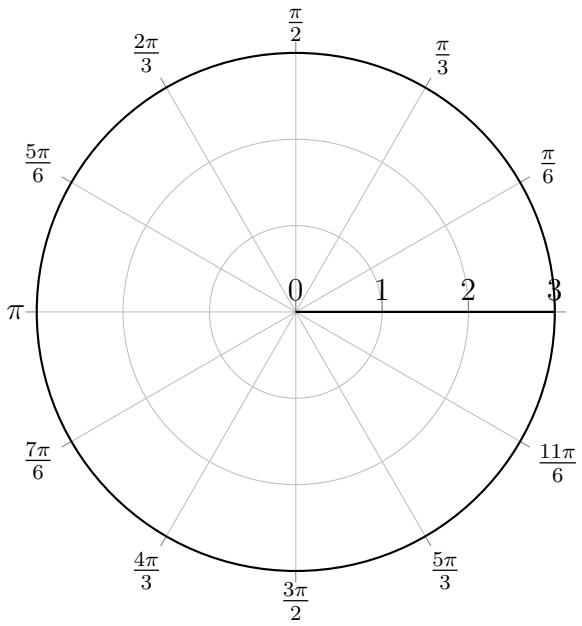
$$x(t) = e^t + e^{-t}$$

$$y(t) = 5 - 2t$$

3. Find the points which have a horizontal tangent line or a vertical tangent line for the following parametric curve.

$$r = 1 - \sin(\theta)$$

4a. Sketch the curve $r = 2 + \sin(\theta)$.



4b. Find the area the curve above encloses.

University of Florida Honor Code:

On my honor, I have neither given nor received unauthorized aid in doing this assignment.

Signature:_____