Multiple Choice

1.(5 pts.) Evaluate $\displaystyle\lim_{x\to-\infty} \frac{\sqrt{4x^6+3}}{x^3+2}$

(a) 6
(b) -2
(c) $3/2$
(d) 2
(e) 4

2.(5 pts.) If $f'(x) = \sqrt{x} + \dfrac{1}{\sqrt{x}}$ and $f(1) = \dfrac{8}{3}$, find the value of $f(4)$.

(a) $27/3$
(b) $25/3$
(c) $26/3$
(d) $24/3$
(e) $28/3$

3.(5 pts.) Estimate the area under the graph of $f(x) = \dfrac{1}{x}$ from $x = 1$ to $x = 3$ using a subdivision of the interval into 4 equal subintervals and using values of $f(x)$ at the **right-hand end-points** of the subintervals.

(a) 1
(b) $9/10$
(c) $19/20$
(d) $17/20$
(e) $4/5$

4.(5 pts.) Evaluate the following indefinite integral $\displaystyle\int \frac{\sin x}{\sqrt{2+\cos x}}\, dx$

(a) $-2\sqrt{2+\cos x} + C$
(b) $\dfrac{1}{\sqrt{(2+\cos x)^3}} + C$

(c) $\sqrt{(2+\cos x)^3} + C$
(d) $\dfrac{2\cos x}{\sqrt{2+\sin x}} + C$

(e) $2\sqrt{2+\sin x} + C$

5.(5 pts.) Evaluate the following definite integral $\displaystyle\int_{-8}^{0} \sqrt{64 - x^2}\, dx$

(a) 16π
(b) $8\sqrt{\pi}$
(c) 32π
(d)   0
(e) 64π

6.(5 pts.) Let $F(x) = \displaystyle\int_{0}^{x^3} \sec t\, dt$ for $0 \le x \le 1$. What is $F'(x)$?

(a) $\sec x^3$
(b) $\dfrac{x^4}{4}\sec x^3$
(c) $\sec x$

(d) $3x^2 \sec(x^3)$
(e) $\sec(3x^2) + C$

7.(5 pts.) Evaluate the definite integral $\int_0^1 x^2(\sqrt{x}+3)\,dx =?$

(a) 5/3 (b) 9/2 (c) 9/7 (d) 7/5 (e) 5/2

8.(5 pts.) Evaluate the definite integral $\int_0^\pi (2x+1)\sin(x^2+x)\,dx.$

(a) 0 (b) $\sin(\pi^2+\pi)-1$

(c) $2\cos(\pi^2+\pi)-2$ (d) $-\cos(\pi^2)+\cos(\pi+1)$

(e) $-\cos(\pi^2+\pi)+1$

9.(5 pts.) Find the area of the region bounded by the curves $y=x^3-x$ and $y=3x$.

(a) 4 (b) 8 (c) -4 (d) 16 (e) 0

10.(5 pts.) The volume of the solid obtained by rotating the region bounded by $y=\sec x$, $y=1$, $x=-1$ and $x=1$ about the x-axis is given by which of the following integrals:

(a) $2\pi\int_0^1 x(1-\sec x)^2\,dx$ (b) $\pi\int_{-1}^1 x(\sec^2 x-1)x\,dx$

(c) $\pi\int_{-1}^1 (1-\sec^2 x)\,dx$ (d) $\pi\int_{-1}^1 (\sec^2 x-1)\,dx$

(e) $\pi\int_{-1}^1 (\sec x-1)^2\,dx$

Partial Credit
You must show your work on the partial credit problems to receive credit!

11.(10 pts.)   Consider the function $y = \dfrac{x^2}{x^2 + 3}$

(a) On which intervals is the function decreasing?

Answer: _____

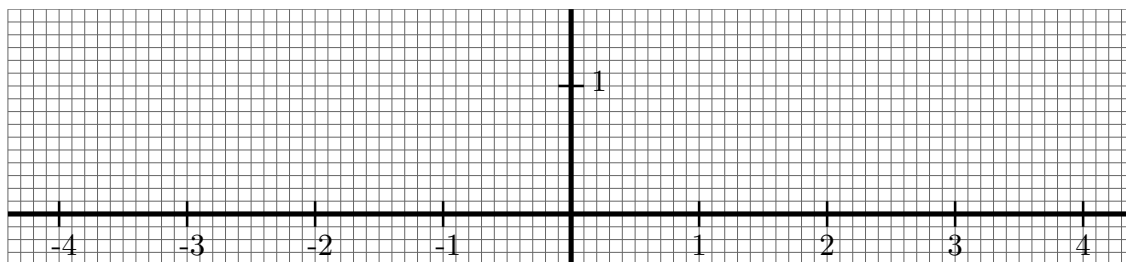(b) On which intervals is the function concave up?

Answer: _____

(c) Does the function have any horizontal asymptotes and if so what are they?
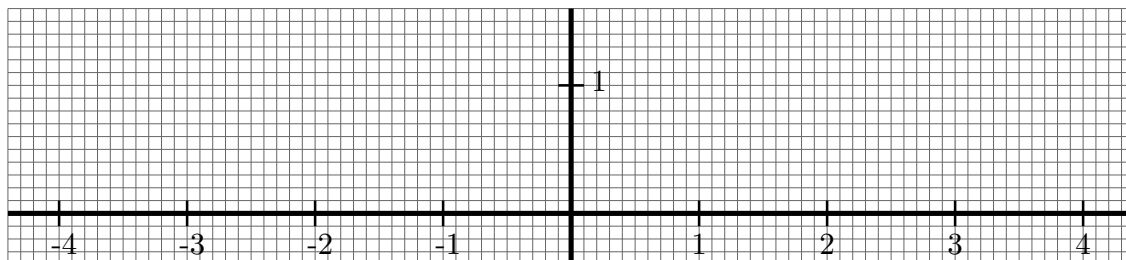
Answer: _____

(d) Sketch the function on the next page. The top graph is for you to do your scratch work. Use the bottom graph for your final answer.

1

-4   -3   -2   -1   1   2   3   4

Final answer

1

-4   -3   -2   -1   1   2   3   4

12.(10 pts.)   A cylindrical can without a top is made to contain 1000 cm^3 of liquid. Find the dimensions of the can that will minimize the cost of the metal to make the can. Be sure to show that your answer is actually an absolute minimum.

13.(10 pts.)   A particle is moving in a straight line with acceleration

$$a(t) = 1 + \cos t$$

and initial velocity $v(0) = 0$ and initial position $s(0) = 0$. Find the position of the particle at time t. Show your work.

14.(10 pts.)   In attempting to solve the equation $2 - \sec x = \tan x$ on $[0, \frac{\pi}{2})$ by Newton's method we begin with $x_1 = \frac{\pi}{4}$. Find the value of x_2 in this process. Show your work.

15.(10 pts.)   Use the washer method to find the volume of the solid obtained by rotating the region bounded by $y = x + 2$ and $y = 4x - x^2$ about the line $y = 3$. Show your work.

Name: __ANSWERS__

Instructor: __ANSWERS__

Exam III

December 2, 2003

- The Honor Code is in effect for this examination. All work is to be your own.
- No calculators.
- The exam lasts for one hour.
- Be sure that your name is on every page in case pages become detached.
- Be sure that you have all 6 pages of the test.

Good Luck!

PLEASE MARK YOUR ANSWERS WITH AN X, not a circle!

1.	(a)	(•)	(c)	(d)	(e)
2.	(a)	(b)	(c)	(d)	(•)
3.	(a)	(b)	(•)	(d)	(e)
4.	(•)	(b)	(c)	(d)	(e)
5.	(•)	(b)	(c)	(d)	(e)
6.	(a)	(b)	(c)	(•)	(e)
7.	(a)	(b)	(•)	(d)	(e)
8.	(a)	(b)	(c)	(d)	(•)
9.	(a)	(•)	(c)	(d)	(e)
10.	(a)	(b)	(c)	(•)	(e)

DO NOT WRITE IN THIS BOX!

Total multiple choice: _____

11. _____

12. _____

13. _____

14. _____

15. _____

Total: _____