Name: _____

Instructor: _____

Multiple Choice

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

(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) $28/3$

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

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

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

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

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

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

Name: _____

Instructor: _____

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

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

Name: _____

Instructor: _____

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?

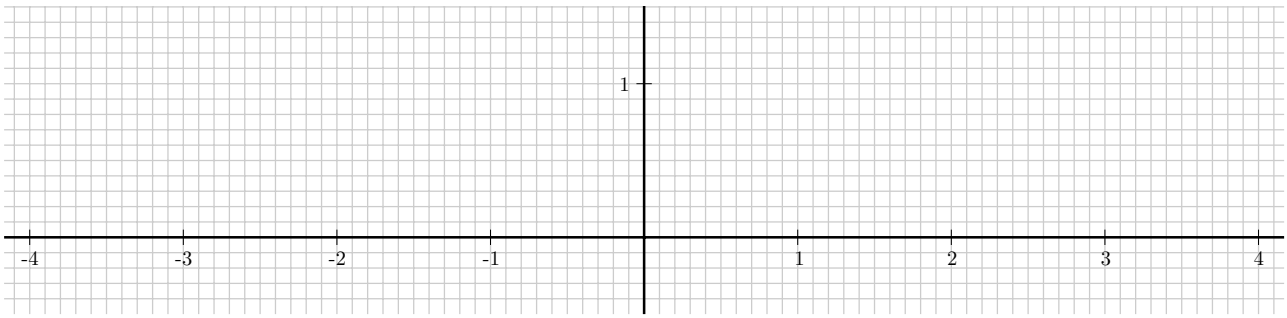
Answer: _____

(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.

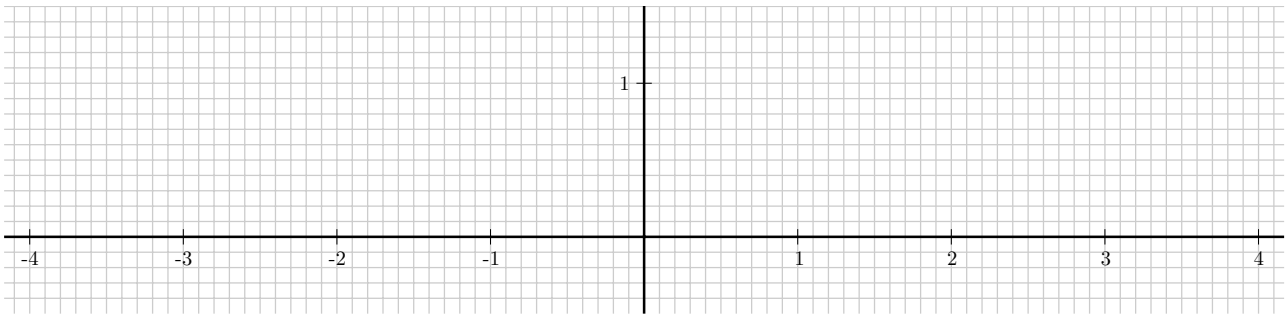
Name: _____

Instructor: _____

Scratch work



Final answer



Name: _____

Instructor: _____

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.

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Instructor: _____

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.

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Instructor: _____

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.

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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 y-axis. XXXX 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 12 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: _____

Name: _____

Instructor: _____

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

DO NOT WRITE IN THIS BOX!

Total multiple choice: _____

11. _____

12. _____

13. _____

14. _____

15. _____

Total: _____