

Name: \_\_\_\_\_

Instructor: \_\_\_\_\_

**Math 10550, Practice Exam III**  
**November 15, 2023**

- The Honor Code is in effect for this examination. All work is to be your own.
- No calculators.
- The exam lasts for 1 hour and 15 min.
- Be sure that your name is on every page in case pages become detached.
- Be sure that you have all 10 pages of the test.

PLEASE MARK YOUR ANSWERS WITH AN X, not a circle!					
1.	(a)	(b)	(c)	(d)	(e)
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4.	(a)	(b)	(c)	(d)	(e)
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5.	(a)	(b)	(c)	(d)	(e)
6.	(a)	(b)	(c)	(d)	(e)
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9.	(a)	(b)	(c)	(d)	(e)
10.	(a)	(b)	(c)	(d)	(e)

<b>Please do NOT write in this box.</b>	
<b>Multiple Choice</b>	_____
11.	_____
12.	_____
13.	_____
Total	_____

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### Multiple Choice

1.(6 pts.) The slant asymptote of  $y = \frac{2x^4 + x^3 + 5}{x^3 - 3x^2 + 2}$  is given by

(a)  $y = 2x - 5$

(b)  $y = 2x + 4$

(c)  $y = 2x + 7$

(d)  $y = x + 4$

(e) There are no slant asymptotes.

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

(a)  $3/2$

(b)  $6$

(c)  $2$

(d)  $-2$

(e)  $4$

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3.(6 pts.) If we want to use Newton's method to find an approximate solution to

$$\cos(x) - x = 0$$

with initial approximation  $x_1 = \frac{\pi}{2}$ , what is  $x_2$ ?

- (a)  $\pi$                       (b)  $\frac{\pi}{4}$                       (c)  $0$                       (d)  $\frac{3\pi}{4}$                       (e)  $\frac{\pi}{2}$

4.(6 pts.) A bug being chased by a kitten (both moving in a straight line) enters a kitchen with velocity 1 ft/sec, and accelerates at  $\frac{2}{\sqrt{t}}$  ft/sec<sup>2</sup>. How fast is the bug moving 9 seconds later.

- (a) 5 ft/sec                      (b) 37 ft/sec                      (c) 13 ft/sec  
(d) 4 ft/sec                      (e) 7 ft/sec





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9.(6 pts.) Evaluate

$$\int_1^2 \frac{\sec^2(\sqrt{x})}{\sqrt{x}} dx.$$

(a)  $\frac{\tan(2)}{2} - \frac{\tan(1)}{2}$

(b)  $2 \tan(\sqrt{2}) - 2 \tan(1)$

(c)  $\frac{\tan(\sqrt{2})}{2} - \frac{\tan(1)}{2}$

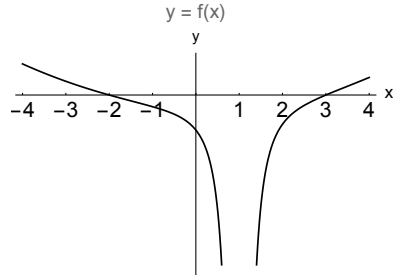
(d)  $\tan(\sqrt{2}) - \tan(1)$

(e)  $2 \tan(2) - 2 \tan(1)$

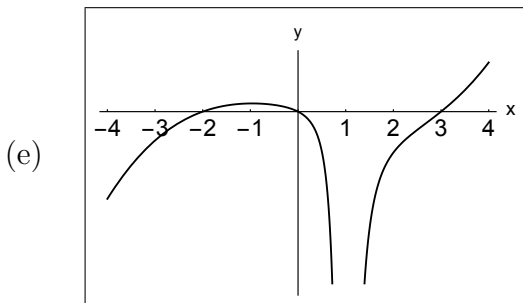
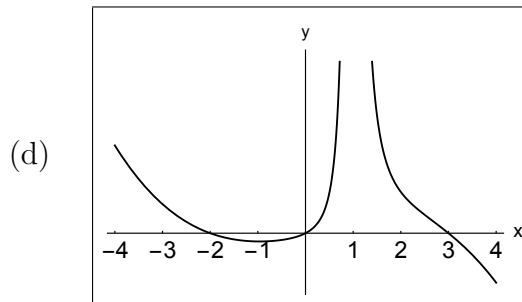
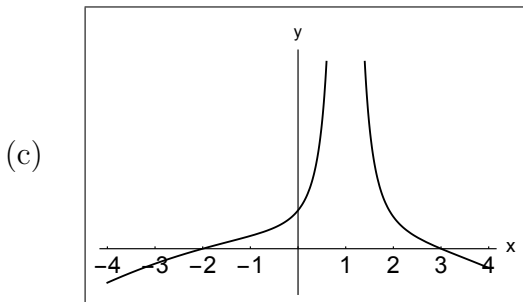
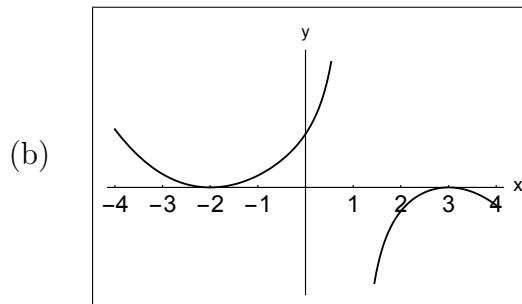
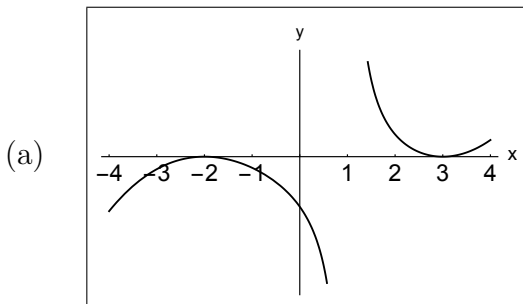
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10.(6 pts.) The graph of  $f(x)$  is shown below:



which of the following gives the graph of an antiderivative for the function  $f(x)$ ?



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**Partial Credit**

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

**11.**(13 pts.) A page of a book is to have a total area of 150 square inches, with 1 inch margins at the top and sides, and a 2 inch margin at the bottom. Find the dimensions in inches of the page which will have the largest print area.



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**12.**(13 pts.) A particle is moving in a straight line with acceleration

$$a(t) = 4 \left( t^2 - \frac{1}{3} \right) \text{ ft/s}^2,$$

where distance is measured in feet and time in seconds. The initial velocity of the particle is  $v(0) = 0$  ft/s and the initial position of the particle is  $s(0) = 0$ .

(a) Find the velocity of the particle at time  $t$  (i.e. find  $v(t)$ ).

(b) Find the position of the particle at time  $t$  (i.e. find  $s(t)$ ).

(c) Find the values of  $t$  for which  $v(t) = 0$  on the interval  $[0, \infty)$ .

(d) Find the distance travelled by the particle on the time interval  $0 \leq t \leq 2$ .

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**13.**(14 pts.) Evaluate the definite integral shown below using right endpoint approximations and the limit definition of the definite integral

$$\int_0^2 \frac{x}{2} dx$$

$\left( \text{Note: } 1 + 2 + 3 + \cdots + n = \sum_{i=1}^n i = \frac{n(n+1)}{2}. \right)$  Verify your answer using the fundamental theorem of calculus.

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