MATH 1300: CALCULUS 1

October 5, 2005

2nd MIDTERM TEST

YOUR NAME:

- ◯ **001** A. Pence ..... (8am)
- ◯ **002** A. Spina ..... (8am)
- ◯ **003** I. Becker ..... (8am)
- ◯ **004** E. Frugoni ..... (8am)
- ◯ **005** T. Seguin ..... (9am)
- ◯ **006** I. Mishev ..... (9am)
- ◯ **007** J. Johanson ..... (9am)
- ◯ **008** J. Sanders ..... (9am)
- ◯ **009** J. Nibert ..... (9am)
- ◯ **010** J. Wiscons ..... (10am)
- ◯ **012** V. Wong ..... (11am)
- ◯ **013** E. Kim ..... (11am)
- ◯ **014** T. Schumacher ..... (12pm)
- ◯ **015** J. Clelland ..... (1pm)
- ◯ **016** J. Meadows ..... (2pm)
- ◯ **018** E. Angel ..... (4pm)
- ◯ **019** C. Seacrest ..... (4pm)

Show all your work.

Answers out of the blue and without any supporting work will receive no credit *even if they are right!*

Write clearly. **Box your final answers.**

No calculators allowed. **No cheat sheets allowed.**

After you get the test back, if you consider that something was incorrectly graded,
DO NOT WRITE ON YOUR TEST!
As clearly as possible write down your version of the story on a clean sheet of paper, attach it to your test, and give it back to your instructor for further consideration.

DO NOT WRITE ON THIS BOX!

problem	points	score
1	15 pts	
2	15 pts	
3	20 pts	
4	20 pts	
5	15 pts	
6	15 pts	
TOTAL	100 pts	

1: *(15 points)*
(a) Complete the following definition:
A function $f(x)$ is continuous at $x = a$ if:

(b) Find all values of x, if any, where the following function is not continuous. (You must justify your answer!)

$$f(x) = \begin{cases} 3x^2 + 5 & x \neq 1 \\ 8 & x = 1 \end{cases}$$

2: *(15 points)* Use the definition of derivative to find $f'(x)$ if

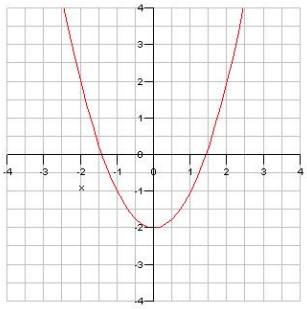
$$f(x) = x^2 + x.$$

(No credit will be given for using the power rule; you MUST use the definition of derivative for this problem. SHOW ALL YOUR WORK.)

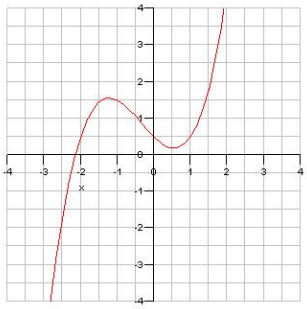
3: *(20 points)* Match the graphs of the functions shown in (1) - (5) with the graphs of their derivatives in (A) - (E).

1. _____ 2. _____ 3. _____ 4. _____ 5. _____

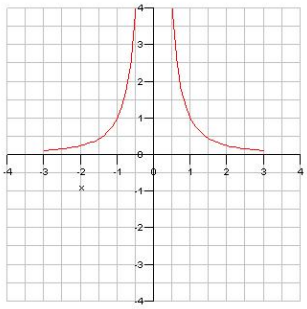
1.



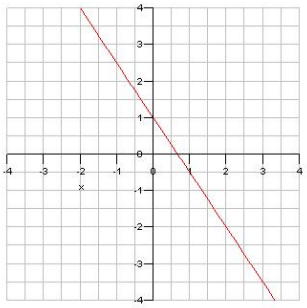
2.



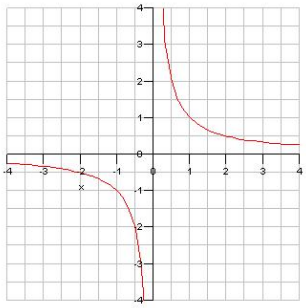
3.



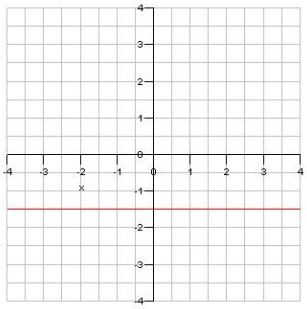
4.



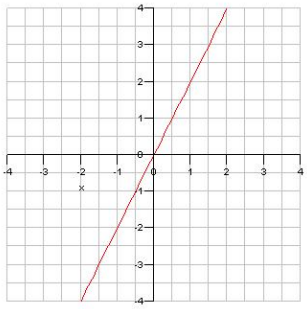
5.



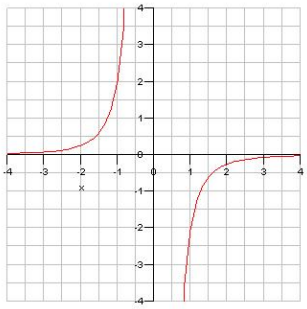
A.



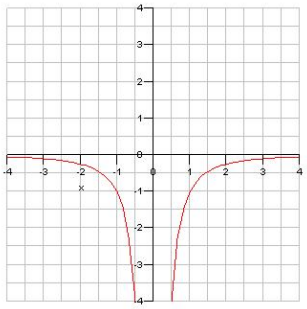
B.



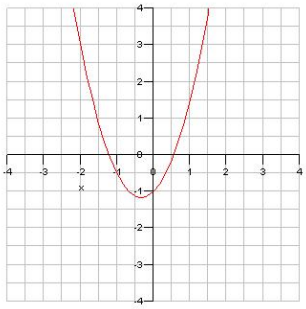
C.



D.



E.



4: *(20 points)* Find the derivative of each of the following functions. IT IS NOT NECESSARY TO SIMPLIFY YOUR ANSWERS, AND DOING SO MAY LEAD TO A LOSS OF POINTS IF YOU DO IT INCORRECTLY.

(a) $f(x) = 3x^3 - 9x^2 + 2x + 1$

(b) $f(x) = \sqrt{\pi}$

(c) $f(x) = x + \cos x$

(d) $f(x) = x^3 \sin x$

(e) $f(x) = (x - 3x^2)^{22}$

5: *(15 points)* Use the Intermediate Value Theorem to prove that the equation

$$x^{40} - 3x = 2$$

has a solution in the interval $[-1, 1]$.

6: *(15 points)* A spherical balloon is being inflated. The radius r of the balloon is increasing at the rate of $0.2\,\text{cm/s}$ when $r = 4\,\text{cm}$. At what rate is the volume V of the balloon increasing at that instant? (Hint: the volume of a sphere with radius r is $V = \frac{4}{3}\pi r^3$.)