

Math 035 Final Examination, Spring 2005

Name:

Instructor:

Attention:

- 1) All cell phone must be switched off and kept in your bag, Or you can leave your phone at the teacher's desk if you are afraid of missing important calls.
- 2) Exact numbers, such as $1/3$, $\sqrt{2}$ and $\sin 1$, rather than their approximations, such as 0.333, 1.414... etc., are preferred as answers.
- 3) Must show some detail rather than just show the final answer.
- 4) Calculators are not allowed.

(1) Find the following limits.

a) (3pts) $\lim_{x \rightarrow 1} \frac{x}{2+x}$.

b) (3pts) $\lim_{x \rightarrow 2} \frac{x^2 + 3x - 10}{x - 2}$.

c) (3pts) $\lim_{x \rightarrow \infty} \frac{\sqrt{x^2 + 3x - 10}}{x - 2}$.

Do not write
in this space

Page # of pts

1 (9)

2 (19)

3 (22)

4 (10)

5 (10)

6 (10)

7 (10)

8 (10)

Total (100)

d) (3pts) $\lim_{x \rightarrow 1} \frac{x^2 - 1}{|x - 1|}$.

e) (5pts) $\lim_{x \rightarrow 0} \sin(x)^{\frac{1}{\ln(x)}}$.

f) (3pts) $\lim_{t \rightarrow 1} \int_1^t f(x) dx$

(2) Find $F'(x)$ where $F(x)$ is given below.

a) (4pts) $F(x) = x^2 + e^x + x^e + e^\pi + \ln x + \ln 2$.

b) (4pts) $F(x) = (x^2 + 2x - 7)^7 (\sin x)^8$.

c) (4pts) $F(x) = \tan^{-1}(x + \sqrt{x})$.

d) (4pts) $F(x) = \frac{x}{1 + \ln(x)}$

e) (5pts) $F(x) = x^x$.

g) (4pts) $F(x) = \int_1^x (e^{t^2} \sin t) dt$.

(3) (5pts) State the definition of $f'(x)$.

(4) (10pts) The equation of a curve is

$$x^3 + y^3 = 6xy.$$

- a) Show that the point (3, 3) is on the curve.
- b) Find the equation of the tangent line to the curve at the point (3, 3).
- c) For what value(s) of x (if any) is the tangent line horizontal?

- (5) (10pts) A 13-ft ladder is leaning against a wall. Its base is sliding away from the wall at 5 ft/second. How fast is the top of the ladder sliding down when the base is 12 ft away from the wall?

(7) (10pts) Compute the following integrals:

a) $\int \frac{\sqrt{x} + x^4}{x} dx.$

b) $\int_0^\pi (\sin x + \cos(2x)) dx.$

c) $\int \frac{x^2}{\sqrt{1+x^3}} dx.$

- (8) (10pts) An open box with a square base is to be made of cardboard with a volume of 1ft^3 . Find the dimension of the box that uses the least amount of material.