

Last Name:
Name:
Instructor:

Math 150
Group Final (Spring 2001)

This is the part of the Math 150 Final Exam that is common to all sections.

You are not allowed to use notes, books or calculators.

You have one hour. If you complete this part of the final exam before the time allotted, you may hand in your paper to the proctor and receive the second part of the exam.

Express your answers in simplified form.

Points

- 1.**
- 2.**
- 3.**
- 4.**
- 5.**
- 6.**
- 7.**
- 8.**
- 9.**
- 10.**
- 11.**
- 12.**
- 13.**
- 14.**
- 15.**

In problems 1 – 6, compute the required derivative:

1 (6 pts.)

$$\frac{d}{dx} (x^2 \sin(x))$$

2 (6 pts.)

$$\frac{d}{dx} \left(\frac{x}{x^2 + 4} \right)$$

3 (6 pts.)

$$\frac{d}{dx} \tan(x^2)$$

4 (6 pts.)

$$\frac{d}{dx} \arcsin\left(\frac{x}{4}\right)$$

5 (6 pts.)

$$\frac{d}{dx} \ln(\sqrt{x^2 + 9})$$

6 (6 pts) Compute

$$\int_0^1 \frac{d}{dt} (e^{-t} \cos(\pi t)) dt$$

7 (6 pts.) Compute

$$\frac{d}{dx} \int_{\pi/2}^x \sqrt{1 - \frac{1}{4} \sin^2(u)} du$$

In problems 8 – 11, compute an antiderivative:

8 (8 pts.)

$$\int \frac{\sin(x)}{\cos^4(x)} dx$$

9 (8 pts.)

$$\int \frac{x^3}{x^4 - 16} dx$$

10 (6 pts.)

$$\int e^{-x/4} dx$$

11 (10 pts.)

$$\int \frac{1}{(x-2)^2+9} dx$$

12 (8 pts.) Compute

$$\int_{\pi/2}^{\pi} \sin^2(x) \cos(x) dx$$

13 (4 pts.) Determine

$$\lim_{x \rightarrow 2^-} \frac{x}{x-2}$$

(there is no need for an explanation)

14 (8 pts.) Use L'Hospital's rule to determine

$$\lim_{x \rightarrow 1} \frac{\ln(x) - x + 1}{(x-1)^2}$$

15 (6 pts.) Use L'Hospital's rule to determine

$$\lim_{x \rightarrow +\infty} x^2 e^{-x}$$

Answers:

1 $2x \sin(x) + x^2 \cos(x)$

2 $-\frac{x^2 - 4}{(x^2 + 4)^2}$

3 $2x \sec^2(x^2)$

4 $\frac{1}{\sqrt{(16 - x^2)}}$

5 $\frac{x}{x^2 + 9}$

6 $-e^{-1} - 1$

7 $\sqrt{1 - \frac{1}{4} \sin^2(x)}$

8 $\frac{1}{3 \cos^3(x)}$

9 $\frac{1}{4} \ln(|x^4 - 16|)$

10 $-4e^{-x/4}$

11 $\frac{1}{3} \arctan\left(\frac{1}{3}x - \frac{2}{3}\right)$

12 $-\frac{1}{3}$

13 $-\infty$

14 $-\frac{1}{2}$

15 0