

Math 122 final exam topics

These are some sample problems– for more examples, see your homework problems from the appropriate section. These sample problems are not meant to be exhaustive of what you should know from each section.

Old topics (50% of the exam)

7.1: Antiderivatives

- $\int \frac{1}{x^2} + \frac{1}{x} - 2x^3 dx$

7.2: u -substitution

- $\int x^2 e^{x^3} dx$

7.3: Definite integral, rectangles

- Estimate $\int_0^3 2x - 7 dx$ using 6 rectangles, with the left-endpoints.
- Estimate the area under $y = x^2$ between $x = 1$ and $x = 3$ using 4 rectangles and the midpoints.

7.4: Fundamental Theorem of Calculus

- $\int_0^3 2x - 7 dx$
- Find the area under $y = x^2$ between $x = 1$ and $x = 3$
- Word problems about “total change”, e.g. 7.4 #55a.

7.5: Area between curves

- Find the area bounded between $y = x^2 - 30$ and $y = 10 - 3x$

7.6: Trapezoid / Simpson’s rules

- Estimate $\int_0^3 2x - 7 dx$ using 6 subintervals with Simpson’s rule.

8.1: Integration by parts

- $\int_0^1 (x^2 + 3x)e^x dx$
- $\int x \ln x dx$

(You will need to be able to decide whether to do u -substitution or integration by parts.)

8.2: Volumes of revolution and average value

- Find the volume of the shape obtained by revolving the curve $f(x) = \sqrt{\sin x}$ around the x -axis from $x = 0$ to $x = \pi$.
- Find the average value of $\cos x$ from $x = 0$ to $x = \pi/4$.

8.3: Continuous money flow

In this section, formulas for the present value and accumulated amount will be given to you.

- For the money flow $f(x) = 50x$, compute the present value and accumulated amount of the flow over 5 years, assuming 2% annual continuous interest.

New topics (50% of the exam)

8.4: Improper integrals

- $\int_1^{\infty} 2x^{-3} - x^{-4} dx$

13.1: Trig functions

- Compute $\csc \frac{13\pi}{6}$
- Graph $y = 4 \sin(3x) - 2$

13.2: Derivatives of trig functions

- Find the derivative of $x^3 \cos x$
- Find the derivative of $\csc x$

13.3: Integrals of trig functions

- $\int_0^{\pi/6} 5 \cos 2x dx$
- $\int (x + 2) \sin x dx$