

Math 231, BL1 - Calculus I Review Questions

These questions are to help you review some concepts and calculational techniques which you will need to use in Math 231. If you have trouble with some of these questions, please spend some more time reviewing on your own! Dr. Mortensen can direct you to additional review materials if you need them.

1. What is meant by $\int_a^b f(x) dx$ (in your own words)?

2. What is the formal definition of $\int_a^b f(x) dx$?

3. What is meant by $\int f(x) dx$ (in your own words)?

4. What is the formal definition of $\int f(x) dx$?

5. What is the relationship between $\int_a^b f(x) dx$ and $\int f(x) dx$ (in your own words)?

6. State the Fundamental Theorem of Calculus. (Notice that it answers the previous question in a precise way).

7. Find the derivative of:

(a) $x^{2/3}$

(b) e^x

(c) $\ln x$

(d) $\sin x$

(e) $e^x \cos x$ (product rule)

(f) $\frac{x}{x^2 + 1}$ (quotient rule)

(g) $\cos(\sqrt{x})$ (chain rule)

(h) $3e^{\sin x}$ (chain rule)

8. Evaluate each definite or indefinite integral:

(a)

$$\int_1^2 5x^3 - \frac{1}{x} dx$$

(b)

$$\int \sin x dx$$

(c)

$$\int e^{2x} dx \text{ (substitution)}$$

(d)

$$\int_0^1 x(x^2 + 1)^3 dx \text{ (substitution)}$$

9. Evaluate the following limits.

(a)

$$\lim_{x \rightarrow \infty} \frac{1}{x}$$

(b)

$$\lim_{x \rightarrow \infty} \frac{x^2 + \sqrt{x}}{x}$$

(c)

$$\lim_{x \rightarrow -\infty} \sin x$$

(d)

$$\lim_{x \rightarrow 0^+} \frac{1}{x}$$

(e)

$$\lim_{x \rightarrow 0^-} \frac{x^2 + \sqrt{x}}{x}$$

(f)

$$\lim_{x \rightarrow 0} \frac{1}{x^2}$$