

Integration – Advanced Level Worksheet

Student Name: _____

1. $\int x \cdot \ln(x) \, dx =$

- a) $(x^2/2) \ln(x) - (x^2/2) + C$
- b) $x \ln(x) - x + C$
- c) $(x^2/2) \ln(x) - (x^2/4) + C$
- d) $\ln(x)/x + C$

2. $\int \frac{2x-1}{x^2(x-1)} \, dx =$

- a) $-\ln|x| + \ln|x-1| + C$
- b) $\ln|x| + \ln|x-1| + C$
- c) $\ln|x| - \ln|x-1| + C$
- d) $-x \ln|x^2| + \ln|x-1| + C$

3. If $I = \int e^x \sin(x) \, dx$, then I equals:

- a) $e^x(\sin x + \cos x) + C$
- b) $e^x(\sin x - \cos x) + C$
- c) $e^x \sin(x) + C$
- d) $\frac{1}{2}e^x(\sin x - \cos x) + C$

4. $\int (x^2 + 3) / (x^3 + 9x) \, dx =$

- a) $(1/2) \ln|x^3 + 9x| + C$
- b) $(1/3) \ln|x^3 + 9x| + C$
- c) $\ln|x^3 + 9x| + C$
- d) $x / (3(x^3 + 9x)) + C$

5. $\int_0^{\pi/2} \sin^2(x) \, dx =$

- a) 1
- b) $\pi/2$
- c) $\pi/4$
- d) 2

6. If $f(x) = e^{-x^2}$, which of the following is true?

- a) It has an elementary antiderivative.
- b) It can be integrated using substitution.
- c) It cannot be expressed in terms of elementary functions.
- d) It equals $e^{-x^2} + C$.

7. $\int \tan(x) \, dx =$

- a) $\ln|\cos(x)| + C$
- b) $-\ln|\cos(x)| + C$
- c) $\ln|\sin(x)| + C$
- d) $-\ln|\sin(x)| + C$

8. $\int (x^2 - 2x^4) / (x^4) \, dx =$

- a) $\frac{1}{x} + 2x + C$
- b) $-\frac{1}{x} + 2x + C$
- c) $-\frac{1}{x} + C$
- d) $-\frac{1}{x} - 2x + C$

9. $\int (1/\sqrt{a^2 - x^2}) \, dx =$

- a) $\tan^{-1}(x/a) + C$
- b) $\sin^{-1}(x/a) + C$
- c) $\cos^{-1}(x/a) + C$
- d) $\ln |x + \sqrt{a^2 - x^2}| + C$

10. $\int (\ln x)^2 =$

- a) $\frac{\ln(x)-1}{x} + C$
- b) $x[\ln(x) - x \ln(x) + 2x] + C$
- c) $\frac{\ln(x)}{3} + C$
- d) $x[(\ln(x))^2 - 2\ln(x) + 2] + C$