

A-Level Mathematics

Name: _____ Score: _____

1. Solve $|x - 2| < 3$. The solution is $-1 < x < ?$ What is the upper bound?

2. Evaluate $\log_2(8)$.

3. The secant function $\sec \theta$ is equal to:

☐ $1 / \cos \theta$

☐ $1 / \sin \theta$

☐ $1 / \tan \theta$

☐ $\cos \theta / \sin \theta$

4. The derivative of $\ln x$ is $1/x$. What is its value at $x = 4$?

5. What is $\int e^x dx$?

☐ $e^x + C$

☐ $x e^x + C$

☐ $e^{x+1} + C$

☐ $\ln x + C$

6. If $f(a)$ and $f(b)$ have opposite signs (and f is continuous between them), then between a and b there is:

☐ at least one root

☐ no root

☐ a maximum only

☐ always exactly two roots

7. By the remainder theorem, what is the remainder when $p(x) = x^2 + 3x + 2$ is divided by $(x - 1)$?

8. What is $\ln(e^5)$?

9. What is $\int (1/x) dx$?

☐ $\ln|x| + C$

☐ $1/x^2 + C$

☐ $x^{-2} + C$

☐ $e^x + C$

10. An iterative formula has the form:

☐ $x_{\{n+1\}} = F(x_n)$

☐ $x = a + b$

☐ $f(x) = 0$ only

☐ $x_n = n^2$

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1. **5**

$|x - 2| < 3$ means $2 - 3 < x < 2 + 3$, i.e. $-1 < x < 5$.

2. **3**

$2^3 = 8$, so $\log_2(8) = 3$.

3. **$1 / \cos \theta$**

$\sec \theta = 1/\cos \theta$; $\csc \theta = 1/\sin \theta$; $\cot \theta = 1/\tan \theta$.

4. **0.25**

$d/dx(\ln x) = 1/x = 1/4 = 0.25$.

5. **$e^x + C$**

e^x is its own integral (and derivative): $\int e^x dx = e^x + C$.

6. **at least one root**

A sign change of a continuous function guarantees a root between a and b.

7. **6**

Remainder = $p(1) = 1 + 3 + 2 = 6$.

8. **5**

$\ln$ and e are inverses, so $\ln(e^5) = 5$.

9. **$\ln|x| + C$**

$\int(1/x) dx = \ln|x| + C$ (the power rule fails for $n = -1$).

10. **$x_{\{n+1\}} = F(x_n)$**

Iteration repeatedly applies $x_{\{n+1\}} = F(x_n)$ from a first guess.