Multiple choice questions - Roots of polynomials, series and Maclaurin

Year: Further Maths · 10

Question 1 The product of the roots of $2x^3 - 5x^2 + x - 8 = 0$ is:

- **A.** -4
- **B.** 4
- **C.** $\frac{5}{2}$
- **D.** -8

Question 2 If $\alpha + \beta = 3$ and $\alpha\beta = -2$ then $\alpha^2 + \beta^2 =$

- **A.** 5
- **B.** 13
- **C.** -1
- **D.** 7

Question 3 $\sum_{r=1}^{10} r =$

- **A.** 45
- **B.** 55
- **C.** 100
- **D.** 385

Question 4 $\sum_{r=1}^{3} r^3 =$

- **A.** 14
- **B.** 27
- **C.** 36
- **D.** 9

Question 5 The Maclaurin series of $\cos x$ begins:

- **A.** $1 + \frac{x^2}{2}$
- **B.** $1 - \frac{x^2}{2}$
- **C.** $x - \frac{x^3}{6}$
- **D.** $1 - x^2$

Question 6 The series for $\ln(1 + x)$ is valid for:

- **A.** all x

- ◯ **B.** -1
- ◯ **C.** $|x|$ only
- ◯ **D.** $x > 0$

Question 7 For $\sum_{r=1}^{n} \left(\frac{1}{r} - \frac{1}{r+1}\right)$ the sum is:

- ◯ **A.** 1
- ◯ **B.** $\frac{1}{n+1}$
- ◯ **C.** $1 - \frac{1}{n+1}$
- ◯ **D.** $\frac{n}{n-1}$

Question 8 If the roots of $f(x) = 0$ are α, β, the equation with roots $\alpha - 2, \beta - 2$ is found with the substitution:

- ◯ **A.** $x = y - 2$
- ◯ **B.** $x = y + 2$
- ◯ **C.** $x = 2y$
- ◯ **D.** $x = 1/y$

Question 9 The coefficient of x^2 in the Maclaurin series of e^{3x} is:

- ◯ **A.** $\frac{9}{2}$
- ◯ **B.** 3
- ◯ **C.** 9
- ◯ **D.** $\frac{3}{2}$

Question 10 The Maclaurin series of $\sin x$ up to x^3 is:

- ◯ **A.** $x - \frac{x^3}{3}$
- ◯ **B.** $x + \frac{x^3}{6}$
- ◯ **C.** $x - \frac{x^3}{6}$
- ◯ **D.** $1 - \frac{x^2}{2}$

Answer grid - Roots of polynomials, series and Maclaurin

Year: Further Maths

Question	Answer	Explanation
1	**B**	$\alpha\beta\gamma = -d/a = 8/2 = 4$.
2	**B**	$9 - 2(-2) = 13$.
3	**B**	$\frac{1}{2} \cdot 10 \cdot 11$.
4	**C**	$1 + 8 + 27 = 36$.
5	**B**	$\cos x = 1 - \frac{x^2}{2!} + \ldots$.
6	**B**	Includes $x = 1$ (conditionally convergent), excludes -1.
7	**C**	Telescoping.
8	**B**	$y = x - 2 \Rightarrow x = y + 2$.
9	**A**	$\frac{3^2}{2!}$.
10	**C**	$\sin x = x - \frac{x^3}{3!} + \ldots$.