

AP Calculus BC

$$1) \sum_{k=0}^{\infty} \frac{2}{6^{k+1}} = \sum_{k=0}^{\infty} 2\left(\frac{1}{6}\right)^{k+1}$$

$$S = \frac{\frac{1}{3}}{1 - \frac{1}{6}} = \frac{\frac{1}{3}}{\frac{5}{6}} = \frac{2}{5} \text{ (C)}$$

$$3) 1 + \frac{1}{3} + \frac{1}{5} + \frac{1}{7} + \frac{1}{9}$$

$$a_n = \frac{1}{2n-1}$$

(B)

$$5) \int_1^{\infty} \frac{1}{x^2} \cdot e^{1/x} dx = \lim_{b \rightarrow \infty} \int_1^b \frac{1}{x^2} e^{1/x} dx$$

$$\lim_{b \rightarrow \infty} \left[-e^{1/x} \right]_1^b = \lim_{b \rightarrow \infty} \left[-e^{1/b} + e \right]$$

$$= \boxed{e-1} \text{ (B)}$$

$$7) (i) \sum_{n=1}^{\infty} \frac{1}{n} \text{ diverges by harmonic series}$$

$$(ii) \sum_{n=1}^{\infty} \frac{1}{e^n} = S$$

$$r = \frac{1}{e} < 1, S \text{ converges by GST}$$

$$(iii) \sum_{n=1}^{\infty} \frac{1}{\sqrt{n}} = \sum_{n=1}^{\infty} \frac{1}{n^{1/2}} = S$$

$$p = \frac{1}{2} < 1, S \text{ diverges by p-series}$$

$$(iv) \sum_{n=1}^{\infty} n = S \quad \lim_{n \rightarrow \infty} n = \infty$$

$$S \text{ diverges by } n^{\text{th}} \text{ term test}$$

(A)

WS 77 Sequences & Series Review

$$2) a_1 = 1; a_2 = 3; a_n = 2a_{n-1} + 3$$

$$a_3 = 9 \quad a_4 = 21 \quad a_5 = 45 \quad a_6 = 93$$

(D)

$$4) \sum_{n=1}^{\infty} \frac{1}{(\sqrt{3}-1)^n} = \sum_{n=1}^{\infty} \left(\frac{1}{\sqrt{3}-1}\right)^n = S$$

$$r = \frac{1}{\sqrt{3}-1} > 1, S \text{ diverges by GST}$$

$$6) (i) \sum_{n=1}^{\infty} \left(\frac{5}{3}\right)^n = S$$

$$r = \frac{5}{3} > 1, S \text{ diverges by GST}$$

$$(ii) \sum_{n=1}^{\infty} \frac{2}{n} = S$$

$$p = 1, S \text{ diverges by p-series}$$

$$(iii) \sum_{n=1}^{\infty} \frac{1}{n^{5/2}} = S$$

$$p = \frac{5}{2} > 1, S \text{ converges by p-series}$$

$$(iv) \sum_{n=1}^{\infty} \frac{1}{n^3} = S$$

$$p = 3 > 1, S \text{ converges by p-series}$$

(B)

$$8) \sum_{n=1}^{\infty} \left(\frac{1}{3}\right)^{n-1}$$

$$S = \frac{1}{1 - \frac{1}{3}} = \frac{3}{2}$$

$$9) \sum_{n=1}^{\infty} \frac{(-1)^{n-1}}{2^{n-1}} = \sum_{n=1}^{\infty} \left(-\frac{1}{2}\right)^{n-1}$$

$$S = \frac{1}{1 + \frac{1}{2}} = \frac{1}{\frac{3}{2}} = \frac{2}{3}$$