2013년 국가직 9급 수학 인책형 해설

01. ③	02. ③	03. ①	04. ②	05. ①	06. ②	07. ①	08. ①	09. ④	10. ③
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1.【정답】 ③

덧셈 : $-1+1=0 \notin A$이므로 닫혀있지 않다.

뺄셈 : $-1-1=-2 \notin A$이므로 닫혀있지 않다.

2.【정답】 ③

$\alpha^2+k\alpha+5=0$

$\alpha^2+5\alpha+k=0$

$(k-5)\alpha+(5-k)=0$

$\alpha=1,\ 1+k+5=0,\ k=-6$

$k+\alpha=-6+1=-5$

3.【정답】 ①

$x^2(x+2)-(x+2)=(x^2-1)(x+2)=(x-1)(x+1)(x+2)=40$

$(x-1)(x+1)(x+2)=2\cdot 4\cdot 5$

$x=3$

4.【정답】 ②

$n=3,\ a=0.5119$

$na=3\times 0.5119=1.5357$

5.【정답】 ①

$$f(9)=\lim_{n\to\infty}\frac{9^{n+1}-1}{9^n+1}=\lim_{n\to\infty}\frac{9-\frac{1}{9^n}}{1+\frac{1}{9^n}}=9$$

$$f\left(\frac{1}{9}\right)=\lim_{n\to\infty}\frac{\left(\frac{1}{9}\right)^{n+1}-1}{\left(\frac{1}{9}\right)^n+1}=-1$$

$$f(9)+f\left(\frac{1}{9}\right)=9-1=8$$

6. 【정답】 ②

$P(x)=(x-1)^2(x+1)Q(x)+a(x-1)^2+2x-1$

$R(x)=a(x-1)^2+2x-1$

$P(-1)=4a-3=3$

$a=\frac{3}{2}$

$R(3)=\frac{3}{2}\times 4+5=11$

7. 【정답】 ①

직선의 방정식 : $y-1=\frac{1-(-2)}{3-(-1)}(x-3)$

$4(y-1)=3(x-3)$

$3x-4y-5=0$

$d=\frac{|3\cdot 0-4\cdot 0-5|}{\sqrt{3^2+4^2}}=1$

8. 【정답】 ①

$\mathrm{P}\left(\frac{46-50}{4}\le Z\le \frac{58-50}{4}\right)=\mathrm{P}(-1\le Z\le 2)=0.3413+0.4772=0.8185$

9. 【정답】 ④

$b+d=\sqrt{a}+\sqrt{c}=2$

기울기 : $\frac{\sqrt{c}-\sqrt{a}}{c-a}=\frac{1}{\sqrt{c}+\sqrt{a}}=\frac{1}{2}$

10. 【정답】 ③

$g(f(1))=g(a+b)=a+b-3=-1,\ a+b=2$

$g^{-1}(f(-1))=g^{-1}(-a+b)=3$

$g(3)=-a+b=0$

$b=1,\ a=1$

$ab=1$

11. 【정답】 ③

$X=AB-A=A(B-E)$

$X=\begin{pmatrix}3&2\\2&1\end{pmatrix}\begin{pmatrix}0&-1\\1&-1\end{pmatrix}=\begin{pmatrix}2&-5\\1&-3\end{pmatrix}$

12. 【정답】 ④

x^2의 계수 : ${}_4C_2 \cdot (3x)^2 \cdot (-2)^2 = 6 \cdot 9 \cdot 4x^2 = 216x^2$

13. 【정답】 ①

$1-\tan\theta = (2+\sqrt{3})(1+\tan\theta)$

$(3+\sqrt{3})\tan\theta = -(1+\sqrt{3})$

$$\tan\theta = \frac{-(1+\sqrt{3})}{3+\sqrt{3}} = \frac{-(1+\sqrt{3})}{\sqrt{3}(1+\sqrt{3})} = -\frac{1}{\sqrt{3}}$$

$$\theta = \frac{5}{6}\pi$$

$$\sin\theta = \frac{1}{2}$$

14. 【정답】 ②

$3^x = X$로 치환하면

$X^2-6X+5 = (X-1)(X-5) = 0$

$3^\alpha = 1,\ 3^\beta = 5$

$3^{2\alpha}+3^{2\beta} = 1^2+5^2 = 26$

15. 【정답】 ③

$\int x^3-2x^2+3dx$의 부정적분중 하나를 $F(x)$라 하면

$$\lim_{h\to 0}\frac{1}{h}\int_1^{1+h} x^3-2x^2+3dx = \lim_{h\to 0}\frac{F(1+h)-F(1)}{h} = f(1) = 1-2+3 = 2$$

16. 【정답】 ④

곡선 $y=x^3$위의 점 $(1, 1)$에서의 접선의 방정식은

$y-1 = 3(x-1),\ y = 3x-2$

따라서 접점의 좌표를 $(k, 3k-2)$라 하면

$k^2+ka+2 = 3k-2$

접점에서 미분계수 값이 3이므로

$2k+a = 3,\ a = 3-2k$

$k^2+k(3-2k)+2 = 3k-2$

$-k^2+4 = 0,\ k = \pm 2$

$a = -1, 7$

$-1+7 = 6$

17. 【정답】 ②

$\sqrt{n^2} < \sqrt{n^2+n+1} < \sqrt{n^2+2n+1}$

$n < \sqrt{n^2+n+1} < n+1$

따라서 정수부분은 n

소수부분은 $\sqrt{n^2+n+1}-n$

$$\lim_{n\to\infty} \sqrt{n^2+n+1}-n = \lim_{n\to\infty} \frac{n+1}{\sqrt{n^2+n+1}+n} = \frac{1}{2}$$

18. 【정답】 ④

$$\sin\theta+\cos\theta = \frac{1}{2}$$

$$(\sin\theta+\cos\theta)^2 = 1+2\sin\theta\cos\theta = 1+2\cdot\frac{k}{4} = 1+\frac{k}{2} = \frac{1}{4}$$

$$k = -\frac{3}{2}$$

19. 【정답】 ②

$x+y=3k$

$y+z=4k$

$z+x=5k$

$2(x+y+z)=12k,\ x+y+z=6k$

$x=2k,\ y=k,\ z=3k$

$$\frac{xy+yz+zx}{x^2+y^2+z^2} = \frac{2k^2+3k^2+6k^2}{4k^2+k^2+9k^2} = \frac{11}{14}$$

20. 【정답】 ④

$S_n = \sum_{k=1}^{n} a_k = \log(n+3)(n+4)$라 하면

$$a_n = S_n - S_{n-1} = \log(n+3)(n+4) - \log(n+2)(n+3) = \log\frac{n+4}{n+2} \quad (n \geq 2)$$

$$a_{2k} = \log\frac{2k+4}{2k+2} = \log\frac{k+2}{k+1} = \log(k+2) - \log(k+1)$$

$$\sum_{k=1}^{29} \log(k+2) - \log(k+1) = (\log3-\log2) + (\log4-\log3) + \cdots + (\log31-\log30)$$

$$= \log31 - \log2 = \log\frac{31}{2}$$

$p+q = 2+31 = 33$