1. All possible word with or without meaning were formed using all the letters of the word 'EXAMINATION'. The probability that 'M' appears at fourth position is:

(1) $\frac{2}{11}$ (2) $\frac{1}{11}$ (3) $\frac{4}{11}$ (4) $\frac{8}{11}$

Ans: 2

Sol: EXAMINATION

$E \rightarrow 1$ $\qquad n(S)=\frac{11!}{2!2!2!}$

$X \rightarrow 1$ $\qquad n(E)=\frac{10!}{2!2!2!}$

$A \rightarrow 2$ $\qquad P(E)=\frac{n(E)}{n(s)}=\frac{1}{11}$

$M \rightarrow 1$

$O \rightarrow 1$

$T \rightarrow 1$

$N \rightarrow 2$

$I \rightarrow 2$

2. If a cricket team consist of 15 players have 6 batsmen, 7 Ballers and 2 wicket keepers then the number of ways in which cricket team formed with atleast 4 batsmen, 5 ballers and 1 wicket keeper

(1) 567 (2) 525 (3) 462 (4) 777

Ans: 4

Sol: Case-I: Team consist 5 Batsman, 5 Bowlers and 1 wicket keeper then number of ways.

$= {}^6C_5 \times {}^7C_5 \times {}^2C_1 = 6 \times 21 \times 2 = 252$

Case-II: 4 Batsmen, 6 blowers and 1 wicket keeper

$= {}^6C_4 \times {}^7C_6 \times {}^2C_1 = 15 \times 7 \times 2 = 210$

Case-III:4 Batsmen, 5 bowler and 2 wicket keepers

${}^6C_4 \times {}^7C_5 \times {}^2C_2 = 15 \times 21 \times 1 = 315$

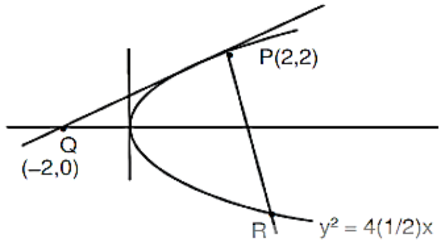
Total $252+210+315=777$

3. Tangent drawn at a point P(2,2) to parabola $y^2=2x$ cuts x-axis at point Q and normal drawn at point P(2,2) to parabola cut parabola again at point R then area of ΔPQR is

(1) 25 (2) $\frac{25}{2}$ (3) $\frac{15}{2}$ (4) 50

Ans: 2

Sol:



Equation of tangent at P(2,2) is T=0

$2y = x + 2$

$y^2 = 4$ So, $Q(-2,0)$

$2at_1 = 1 \Rightarrow t_1 = 2$

$t_2 = -t_1, -\frac{2}{t_1} = -2 - \frac{2}{2} = -3$

$\therefore R\left(\frac{1}{2}(-3)^2, 2\left(\frac{1}{2}\right)(-3)\right) = \left(\frac{9}{2}, -3\right)$

Area of $\Delta PQR = \frac{1}{2}\begin{vmatrix} 2 & 2 & 1 \\ -2 & 0 & 1 \\ \frac{9}{2} & -3 & 1 \end{vmatrix}$

$= \frac{1}{2}[2(0+3) - 2(-2-9/2) + 1(6-0)] = \frac{1}{2}[6+4+9+6] = \frac{25}{2} sq.unit$

4. Coefficient of X^{256} in the expansion of $(1-x)^{101}(x^2+x+1)^{100}$ is

(1) ${}^{100}C_{86}$ (2) ${}^{100}C_{85}$ (3) ${}^{100}C_{84}$ (4) ${}^{100}C_{83}$

Ans: 2

Sol: $\Rightarrow (1-x)^{101}(x^2+x+1)^{100}$

$\Rightarrow (1-x)^{100}(x^2+x+1)^{100}(1-x)$

$\Rightarrow (1-x^3)^{100}(1-x)$

$\Rightarrow (1-x)\left({}^{100}C_0 - {}^{100}C_1x^3 + {}^{100}C_2x^6 + \ldots + {}^{100}C_{84}x^{252} - {}^{100}C_{85}x^{255} + {}^{100}C_{86}x^{256} + \ldots\right)$

$\Rightarrow {}^{100}C_{85}x^{256}$

So, the coefficient of x^{256} is ${}^{100}C_{85}$

5. The value of $\lim_{x\to 0}\left(2-\cos x\sqrt{\cos 2x}\right)^{\frac{x^2+2}{x}}$ is

Ans: 1

Sol: $\lim_{x\to 0}\left(2-\cos\sqrt{\cos 2x}\right)^{\frac{x^2+2}{x}}$ $\left(1^{\infty}\ form\right)$

$$= e^{\lim_{x\to 0}}\frac{\left(1-\cos x\sqrt{\cos 2x}\right)}{x}\left(x^2+2\right)$$

$$= e^{\lim_{x\to 0}}\left\{\frac{1-\cos^2 x\left(\cos 2x\right)}{x}\right\}\left(x^2+2\right)$$

$$= e^{\lim_{x\to 0}}\left\{\frac{1-\cos^2 x\left(\cos 2x\right)}{x}\right\}\left(\frac{x^2+2}{1+\cos x\sqrt{\cos 2x}}\right)$$

$$= e^{\lim_{x\to 0}}\left\{\frac{1-\cos^2\left(2\cos^2 x-1\right)}{x}\right\}\left(\frac{x^2+2}{1+\cos x\sqrt{\cos 2x}}\right)$$

$$= e^{\lim_{x\to 0}}\left\{\frac{1-\cos^2 x\left(\cos 2x\right)}{x}\right\}\left(\frac{x^2+2}{1+\cos x\sqrt{\cos 2x}}\right)$$

$$= e^{\lim_{x\to 0}}\left\{\frac{1-\cos^2\left(2\cos^2 x-1\right)}{x}\right\}\left(\frac{x^2+2}{1+\cos x\sqrt{\cos 2x}}\right)$$

$$= e^{\lim_{x\to 0}}\frac{\left(1-2\cos^4 x+\cos^2 x\right)}{x}\frac{x^2+2}{1+\cos x\sqrt{\cos 2x}}$$

$$= e^{\lim_{x\to 0}}\frac{-\left(2\cos^4 x-\cos^2 x-1\right)}{x}\frac{x^2+2}{1+\cos x\sqrt{\cos 2x}}$$

$$= e^{\lim_{x\to 0}}\frac{\left(2\cos^2 x+1\right)\left(\cos^2-1\right)}{x}\frac{x^2+2}{1+\cos\sqrt{\cos 2x}}$$

$$= e^{\lim_{x\to 0}}\frac{+\left(2\cos^2 x+1\right)\sin^2 x}{x}\frac{x^2+2}{1+\cos x\sqrt{\cos 2x}}$$

$$= e^{\lim_{x\to 0}}\left(2\cos^2 x+1\right)\frac{\sin x}{x}.\sin x\frac{x^2+2}{1+\cos\sqrt{\cos 2x}}$$

$$= e^0 = 1$$

6. If the focal chord $y = mx + c$ of parabola $y^2 = -64x$ is also the tangent to the circle $(x+10)^2 + y^2 = 4$ then absolute value of $4\sqrt{2}(m+c)$ is

Ans: 34

Sol: Focus of parabola is $(-16, 0)$

So, $-16m + c = 0 \Rightarrow c = 16m ...(i)$ w

Now slope form of tangent to the circle

$(x+10)^2 + y^2 = 4$ is given by

$y = m(x+10) \pm 2\sqrt{1+m^2}$

So, $c = 10m \pm 2\sqrt{1+m^2}$ .....(ii)

By (i) and (ii)

$16m = 10m \pm 2\sqrt{1+m^2}$

$\Rightarrow 9m^2 = 1 + m^2 \Rightarrow m = \pm\frac{1}{2\sqrt{2}}$

$\Rightarrow c = 16m = \pm\frac{8}{\sqrt{2}}$

$\therefore 4\sqrt{2}(m+c) = \pm 34$

7. The mean of 6 numbers is 6.5 and its variance is 10.25 if 4 numbers are 2,4,5 and 7; then find the other two:

(1) 10,11 (2) 11,12 (3) 9,12 (4) 9,11

Ans: 1

Sol: Let two number x and y according to question

$18 + x + y = 39$

$x + y = 21$ ....(1)

$$10.25 = \frac{\sum x_i^2}{n} - (\bar{x})^2$$

$$10.25 = \frac{x^2 + y^2 + 4 + 16 + 25 + 49}{6} - (6.5)^2$$

$$10.25 = \frac{x^2 + y^2 + 94}{6} - (6.5)^2$$

$\Rightarrow x^2 + y^2 = 221 \ldots.(2)$

Solving (1) and (2)

SO, $x = 10$ or $y = 11$

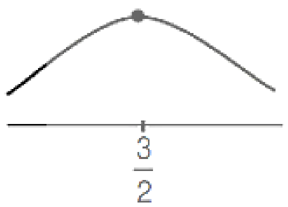
8. A continuous & differentiable function f(x) is increasing in $\left(-\infty, \frac{3}{2}\right)$ and decreasing in $\left(\frac{3}{2}, \infty\right)$ then $x = \frac{3}{2}$ is:

(1) Point of local maxima (2) Point of local minima

(3) Point of Inflection (4) None of these

Ans: 1

Sol: Roughly graph of f(x) can be drawn as



Thus $x = \frac{3}{2}$ is a point of local maxima

9. If the roots of the quadratic equation $x^2 + 3^{\frac{1}{4}}x + 3^{\frac{1}{2}} = 0$ are α and β then the value of $\alpha^{96}\left(\alpha^{12} - 1\right) + \beta^{96}\left(\beta^{12} - 1\right)$

(1) 50.3^{24} (2) 51.3^{24} (3) 52.3^{24} (4) 104.3^{24}

Ans: 3

Sol: $x^2 + \sqrt{3} = -3^{\frac{1}{4}}x$

$\Rightarrow x^4 + 2\sqrt{3}x^2 + 3 = \sqrt{3}x^2$

$\Rightarrow x^4 + \sqrt{3}x^2 + 3 = 0$

$\Rightarrow x^8 + 6x^4 + 9 = 3x^4$

$\Rightarrow x^8 + 3x^4 + 9 = 0$

$\Rightarrow \alpha^8 = -9 - 3\alpha^4$

$\Rightarrow \alpha^{12} = -9\alpha^4 - 3\alpha^8 = -9\alpha^4 - 3\left(-9 - 3\alpha^4\right) = 27$

Similarity $\beta^{12} = 27$

$\Rightarrow \alpha^{96}\left(\alpha^{12} - 1\right) + \beta^{96}\left(\beta^{12} - 1\right) = (27)^8.26 + (27)^8.26 = 52.(27)^8 = 52.3^{24}$

10. In a ΔABC, if $AB = 5, \angle B = \cos^{-1}(3/5)$ and radius of circuimcircle of triangle is 5 then the area of ΔABC is:

(1) $6+8\sqrt{3}$ (2) $3+4\sqrt{3}$ (3) $3+8\sqrt{3}$ (4) $6+4\sqrt{3}$ c

Ans: 1

Sol: $\cos B = \frac{3}{5} \Rightarrow \sin B = \frac{4}{5}, R = 5$

$$\Rightarrow \frac{b}{2R} = \frac{4}{5} \Rightarrow b = 8, c = 5$$

$$\cos = \frac{a^2 + c^2 - b^2}{2ac} = \frac{3}{5} \Rightarrow \frac{a^2 + 25 - 64}{2a(5)} = \frac{3}{5}$$

$$a^2 - 39 = 6a \Rightarrow a^2 - 6a - 39 = 0$$

$$\Rightarrow a = \frac{6+8\sqrt{3}}{2} \Rightarrow a = 3+4\sqrt{3}$$

$$\Delta = \frac{abc}{4R} = \frac{(3+4\sqrt{3})(8)(5)}{4(5)} = 6+8\sqrt{3}$$

11. The number of integral terms is the expansion of $\left(4^{\frac{1}{4}} + 5^{\frac{1}{6}}\right)^{120}$ is:

(1) 11 (2) 21 (3) 20 (4) 30

Ans: 2

Sol: General term of $\left(2^{\frac{1}{2}} + 5^{\frac{1}{6}}\right)^{120}$ is

Given by $T_{r+1} = {}^{120}C_r \left(2^{\frac{1}{2}}\right)^{120-r} \left(5^{\frac{1}{6}}\right)^{r}$

For integral term, r should be a multiple of 6

i.e., $r \in \{0, 6, 12, 18, ..., 120\}$

$\therefore$ 21 integral terms are there in the expansion $\left(2^{\frac{1}{2}} + 5^{\frac{1}{6}}\right)^{20}$

12. If the shortest distance between the lines $\vec{r_1} = \alpha\hat{i} + 2\hat{j} + \lambda(\hat{i} - 2\hat{j} + 2\hat{k}), \lambda \in R, \alpha > 0$ and $\vec{r_2} = -4\hat{i} - \hat{k} + \mu(3\hat{i} - 2\hat{j} - 2\hat{k}), \lambda \in R$ is 9, then the value of α is

(1) 2 (2) 4 (3) 6 (4) $\sqrt{6}$

Ans: 3

Sol: Shortest distance $=\left|\frac{(a_2-a_1).(b_1\times b_2)}{|b_1\times b_2|}\right|$

$$\Rightarrow 9\left|\frac{\left|\left((\alpha+4)\hat{i}+2\hat{j}+3\hat{k}\right).\left(8\hat{i}+8\hat{j}+4\hat{k}\right)\right|}{\sqrt{64+64+16}}\right|$$

$$\Rightarrow\left|\frac{8(\alpha+4)+16+12}{12}\right|=9$$

$\therefore \alpha=6$

13. If a,b,c are mutually $\perp$ unit vectors equally inclined to $\vec{a}+\vec{b}+\vec{c}$ at an angle θ, find $36\cos^2 2\theta$

Ans: 4

Sol: $\left|\vec{a}+\vec{b}+\vec{c}\right|^2=\left(\vec{a}+\vec{b}+\vec{c}\right).\left(\vec{a}+\vec{b}+\vec{c}\right)=\left|\vec{a}\right|^2+\left|\vec{b}\right|^2+\left|\vec{c}\right|^2=3$

$\Rightarrow\left|\vec{a}+\vec{b}+\vec{c}\right|=\sqrt{3}$

Now $\vec{a}\left(\vec{a}+\vec{b}+\vec{c}\right)=\left|\vec{a}\right|\left|\vec{a}+\vec{b}+\vec{c}\right|\cos\theta$

$\Rightarrow\cos\theta=\frac{1}{\sqrt{3}}\Rightarrow\cos 2\theta=2\cos^2\theta-1$

$\Rightarrow\cos 2\theta=-\frac{1}{3}\Rightarrow\cos^2 2\theta=\frac{1}{9}\Rightarrow 36\cos^2 2\theta=4$

14. If z and ω are complex number such that $|z\omega|=1, \arg(z)-\arg(\omega)=\frac{3\pi}{2}$. Find the $\arg\left(\frac{1-2\bar{z}\omega}{1+2\bar{z}\omega}\right)$.

(1) $\frac{\pi}{4}$ (2) $-\frac{\pi}{4}$ (3) $\frac{3\pi}{4}$ (4) $-\frac{3\pi}{4}$

Ans: 4

Sol: Let $z=re^{i\theta}$ & $\omega=\frac{1}{r}e^{i\left(\theta-\frac{3\pi}{2}\right)}$

then $\frac{1-2\bar{z}\omega}{1+3\bar{z}\omega}=\frac{1-2re^{-i\theta}.\frac{1}{r}e^{i\left(\theta-\frac{3\pi}{2}\right)}}{1+3re^{-i\theta}.\frac{1}{r}e^{i\left(\theta-\frac{3\pi}{2}\right)}}$

$$=\frac{1-2e^{i\frac{3\pi}{2}}}{1+3e^{-i\frac{3\pi}{2}}}=\frac{1-2i}{1+3i}$$

$= -\frac{1}{2} - \frac{1}{2}i$

The $\arg\left(-\frac{1}{2} - \frac{1}{2}i\right) = -\frac{3\pi}{4}$

15. If $f(x) = \begin{cases} \sin x - e^x & ; \quad x \le 0 \\ a + [-x] & ; \quad 0 < x < 1 \\ 2x - b & ; \quad x \ge 1 \end{cases}$ is continuous and differentiable function then find the value of $a+b$.

(where [.] is GIF)

Ans: (03.00)

Sol: Since f(x) is continuous at x=0

So $\lim_{x \to 0^-} f(x) = \lim_{x \to 0^+} f(x) = f(0)$

$-1 = a - 1 = -1 \Rightarrow a = 0$

Since f(x) is continuous at $x = 1$

So $\lim_{x \to 1^-} f(x) = \lim_{x \to 1^+} f(x) = f(1)$

$a - 1 = 2 - b = 2 - b$

$\Rightarrow a = 0$, so $0 - 1 = 2 - b$

$\Rightarrow -3 = -b$

$\Rightarrow b = 3$

So the value of $a + b = 3$

16. If $A = \left[a_{ij}\right]_{3\times3}$ where $a_{ij} = \begin{cases} 1 & i = j \\ -x & |i-j| = 1 \\ 2x+1 & other\ wise \end{cases}$ and $f(x) = \det(A)$, then the sum of local maximum and local minimum value of f(x) is:

(1) $\frac{20}{27}$ (2) $\frac{-20}{27}$ (3) $\frac{88}{27}$ (4) $\frac{-88}{27}$

Ans: 4

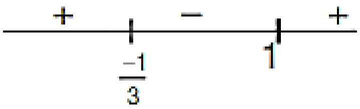
Sol: $|A| = \begin{vmatrix} 1 & -x & 2x+1 \\ -x & 1 & -x \\ 2x+1 & -x & 1 \end{vmatrix} = 1 + x^2(2x+1) + x^2(2x+1) - (2x+1)^2 - x^2 - x^2$

$\Rightarrow f(x) = 4x^3 - 4x^2 - 4x$

$\Rightarrow f'(x) = 12x^2 - 8x - 4$

$= 4\left(3x^2 - 2x - 1\right)$

$= 4\left(x-1\right)\left(3x+1\right)$



$\Rightarrow f\left(x\right)$ is maximum at $x = \frac{-1}{3}$ and minimum at x=1

$\therefore$ maximum value $= \frac{20}{27}$ and minimum value $= -4$

$\therefore$ sum $= \frac{20}{27} - 4 = -\frac{88}{27}$

17. The coefficient of $a^3b^4c^5$ in $\left(ab+bc+ac\right)^6$ is:

(1) 60 (2) 45 (3) 40 (4) 90

Ans: 1

Sol: $\left(ab+bc+ac\right)^6 = \sum_{p+q+r=6} \frac{6!}{p!q!r!}\left(ab\right)^p\left(bc\right)^q\left(ca\right)^r$

$\sum_{p+q+r=6} \frac{6!}{p!q!r!} a^{p+r} b^{p+q} c^{q+r}$

For $a^3b^4c^5$, we need

p + r=3

p + q=4

q + r=5

Solving we get, $p=1, q=3, r=2$

$\therefore$ coefficient of $a^3b^4c^5$ in $\left(ab+bc+ac\right)^6$ is $\frac{6!}{1!2!3!} = 60$

18. If an invertible function f(x) is defined as f(x)=3x-2, g(x) is also an invertible function such that $f^{-1}\left(g^{-1}\left(x\right)\right) = x-2$ then $g\left(x\right)$ is

(1) $\frac{x-8}{3}$ (2) $\frac{x+8}{3}$ (3) $\frac{x-3}{8}$ (4) $\frac{x+3}{8}$

Ans: 2

Sol: $f^{-1}\left(g^{-1}\left(x\right)\right) = x-2$

$f\left(x-2\right) = g^{-1}\left(x\right)$

$3(x-2)-2=g^{-1}(x)$

$3x-8=g^{-1}(x)$

$g^{-1}(x)=3x-8$

Or $x=3g(x)-8$

$g(x)=\dfrac{x+8}{3}$

19. $\int_{-1}^{1}\ln\left(\sqrt{1-x}+\sqrt{1+x}\right)dx=?$

(1) $\pi+\ln 2$ (2) $2\ln 2$ (3) $\dfrac{\pi}{2}-1+\ln 2$ (4) $\ln 2-\dfrac{\pi}{2}-1$

Ans: 4

Sol: $f(x)=\ln\left(\sqrt{1-x}+\sqrt{1+x}\right)$ $x\in[-1,1]$ is an even function

$\Rightarrow I=2\int_{0}^{1}\ln\left(\sqrt{1-x}+\sqrt{1+x}\right)dx$

Put x=cos2$\theta\Rightarrow$ dx=-2sin2θdθ

$\therefore \cos\theta=2\cos^2\theta-1=1-2\sin^2\theta\, d\theta$

$\Rightarrow I=-4\int_{\frac{\pi}{4}}^{0}\left[\ln\left\{(\sin\theta+\cos\theta)\sqrt{2}\right\}\right]\sin 2\theta\ d\theta$

$=4\int_{0}^{\frac{\pi}{4}}\ln\left\{\left(\sin\theta+\cos\theta\sqrt{2}\right)\right\}\sin 2\theta\ d\theta$

$=\int_{0}^{\frac{\pi}{4}}\ln(\sin\theta+\cos\theta)\sin 2\theta\ d\theta+4\ln\sqrt{2}\int_{0}^{\frac{\pi}{4}}\sin 2\theta\, d\theta$

$=4\left[\left|-\ln(\sin\theta+\cos\theta)\dfrac{\cos 2\theta}{2}\right|_{0}^{\frac{\pi}{4}}+\int_{0}^{\frac{\pi}{4}}-\dfrac{\cos\theta-\sin\theta}{\sin\theta+\cos\theta}.\dfrac{\cos 2\theta}{2}d\theta\right]+4\ln\sqrt{2}\left(-\dfrac{\cos 2\theta}{2}\right)\Bigg|_{0}^{\frac{\pi}{4}}$

$=4\left[0-\dfrac{1}{2}\int_{0}^{\frac{\pi}{4}}(\cos\theta-\sin\theta)^2\, d\theta\right]+4\ln\sqrt{2}\left(0+\dfrac{1}{2}\right)$

$$= 4\left[0 - \frac{1}{2}\int_0^{\frac{\pi}{4}}(1-\sin 2\theta)\,d\theta\right] + 2\ln\sqrt{2}$$

$$= -2\left[\theta + \frac{\cos 2\theta}{2}\right]_0^{\frac{\pi}{4}} + \ln 2$$

$$= -2\left[\frac{\pi}{4} - \frac{1}{2}\right] + \ln 2 \quad = -\frac{\pi}{2} - 1 + \ln 2$$

20. The probability selecting integers $a \in [-5, 30]$, such that $x^2 + 2(a+4)x - 5a + 64 > 0$ for all $x \in R$ is :

(1) $\frac{7}{9}$ (2) $\frac{4}{9}$ (3) $\frac{2}{9}$ (4) $\frac{1}{3}$

Ans: 3

Sol: $x^2 + 2(a+4)x - (5a - 64) > 0$

$D < 0$

$\therefore 4(a+4)^2 + 4(5a-64) < 0$

$\Rightarrow (a+4)^2 + (5a-64) < 0$

$\Rightarrow a^2 + 13a - 48 < 0$

$$a = \frac{-13 \pm \sqrt{169+192}}{2} = -16, 3$$

So, $a \in (-16, 3)$

So, $a = -5, -4, -3, -2, -1, 0, 1, 2$

$\therefore$ Required Probability $= \frac{8}{36} = \frac{2}{9}$

21. If $\int_0^a e^{x-[x]}dx - 10e - 9$, then the value of '$a$' is (where $[\square]$ is GIF)

(1) $9 + \ln 2$ (2) $10 + \ln 2$ (3) 10 (4) 9

Ans: 2

Sol: Let $a = 10 + K,\ 0 \le K < 1$

$$\int_0^a e^{\{x\}}dx = 10e - 9$$

$$\int_0^{10} e^{\{x\}}dx + \int_{10}^{10+k} e^{\{x\}}dx = 10e - 10 + 1 \Rightarrow \int_{10}^{10+k} e^{\{x\}}dx = 1 \Rightarrow \int_0^{K} e^{\{x\}}dx = 1$$

$$e^K - 1 = 1$$

$$k = \ln 2$$

So, $a = 10 + \ln 2$

22. If $\vec{A} \times \vec{B} = |\vec{A} \times \vec{B}|$ then $|\vec{A} - \vec{B}|$ is

(1) $\sqrt{A^2 + B^2 + \sqrt{2}AB}$

(2) $\sqrt{A^2 + B^2 - \sqrt{2}AB}$

(3) $\sqrt{A^2 + B^2 + \sqrt{2AB}}$

(4) $\sqrt{A^2 + B^2 - \sqrt{2}AB}$

Ans: 4

Sol: $\vec{A} \times \vec{B} = |\vec{A} \times \vec{B}| \Rightarrow \cos\theta = \sin\theta \Rightarrow \tan\theta = 1$

$$\theta = \frac{\pi}{4}$$

$$|\vec{A} - \vec{B}|^2 = A^2 + B^2 - 2\vec{A}.\vec{B} \quad |\vec{A} - \vec{B}|^2 = A^2 + B^2 - 2\vec{A}.\vec{B}$$

$$= A^2 + B^2 - 2AB\cos\left(\frac{\pi}{4}\right)$$

$$= A^2 + B^2 - \sqrt{2}AB$$

$$\Rightarrow |\vec{A} - \vec{B}| = \sqrt{A^2 + B^2 - \sqrt{2}AB}$$