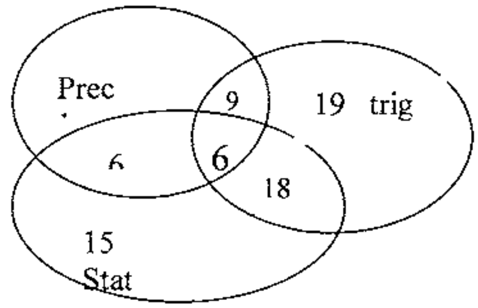
Solutions to Precalculus Team Question Vero Beach Invitational January 24, 2004 pg 1

1 A = 1 B = 35 $(1-35)^4 = 1336336$

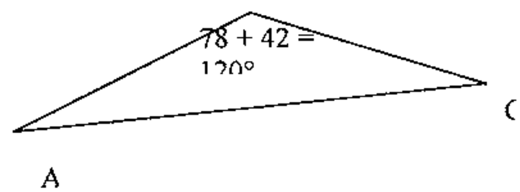


2. m = - ½ Point of intersection (-1, -1) Equation: x + 2y = -3

3. $A=\frac{2\pi}{9}; B=\frac{2\pi}{3}; C=4; D=-2 \Rightarrow Cos^{-1}\left(\frac{\sqrt{\frac{2\pi}{3}}}{\sqrt{\frac{2\pi}{9}}}\cdot\frac{-2}{4}\right)=Cos^{-1}\left(-\frac{\sqrt{3}}{2}\right)=\frac{5\pi}{6}$

4. Use Law of Cosines

$\sqrt{(3^2+4^2-2(3)(4)\cos 120)}=\sqrt{25-24(-\frac{1}{2})}=\sqrt{25+12}=\sqrt{37}$



5. SAS Sides have length of 5 and 9 and the included angle is 11π/12 - 7π/12 = π/3. Use the Law of cosines:

Distance between points $=\sqrt{25+81-2(5)(9)\cos\left(\frac{\pi}{3}\right)}=\sqrt{25+81-45}=\sqrt{61}$

6.

$\frac{(x-6)^2}{16}-\frac{(y+2)^2}{64}=1 \Rightarrow$ slope of asy$=\frac{b}{a}=\frac{8}{4}=2$

$B=\frac{c}{a}=\frac{4\sqrt{5}}{4}=\sqrt{5}\Rightarrow c^2=a^2+b^2; c=\sqrt{64+16}=4\sqrt{5}$

$C=4p=8; -8y+7+9=x^2+6x+9 \Rightarrow y=-\frac{1}{8}(x+3)^2+2$

$D=0$ the vertex is (-3,2) and the focus is 2 below the vertex at(-3,0)

AC-BD=2(8)-$\lim_{x\to\infty}\infty\sqrt{5}(0)=16$

7. Since the speed of the ladybug is a constant and the movement is linear then a simple ratio is used.

$\frac{5}{x}=\frac{\sqrt{(10-2)^2+(3+1)^2}}{\sqrt{(30-10)^2+(13-2)^2}}\Rightarrow x=\frac{25}{2}\quad \therefore 25/2+5=$ total time $=\frac{35}{2}=17.5$

8.

$A=\frac{1}{1-\frac{2}{3}}=3; B=40+74(8)=13764; C=\frac{1(1-2^{11})}{1-2}=2047$

$D=\frac{25(26)(51)-5(6)(11)}{6}=5470 \Rightarrow\Rightarrow \frac{13764}{3}+5470-2047=8011$

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9.Since one of the roots of the function is –2, then a root of f(x-2) is 0, since the function is shifted to the right 2 units. AB = 0; Therefore answer is C

C = the reciprocal of the roots of f(x) =- (4)/(-60) = 1/15

$$A = \frac{{}_6C_4 + {}_6C_5 + {}_6C_6}{2^6} = \frac{15+6+1}{64} = \frac{22}{64} = \frac{11}{32};$$

$$B = \frac{3!6!}{8!} = \frac{3}{28}; C = 1 - \frac{{}_5C_3}{{}_8C_3} = 1 - \frac{5}{28} = \frac{23}{28};$$

10. There are 11 in the sample space {6x1,6x2,6x3,6x4,6x5,6x6,1x6,2x6,3x6,4x6,5x6}

and 5 have a product over 20 $\Rightarrow D = \frac{5}{11}$

$$\frac{11}{32} \times \frac{3}{28} \times \frac{5}{11} \times \frac{28}{23} = \frac{15}{736}$$

11. A = log 30 = log 10 + log 3 = 1 + n B = log 147 = log 3 + 2log 7 = n + 2p
C = log(21/2) = log 3 + log 7 – log 2 = n + p – m D = 3log 2 + 3 log 3+ log 10 = 3m+3n + 1
1 + n + n + 2p + p + n – m – 3m – 3n –1 = 3p – 4m

12. A= sum of coefficients of the expansion = 32 + ${}_5C_1(2)^4(-4)$+ ${}_5C_2(2)^3(-4)^2$ + ${}_5C_3(2)^2(-4)^3$ +${}_5C_4(2)(-4)^4$ + ${}_5C_5(-4)^5$ = -32
B = ${}_9C_5(2)^5$ = 4032 C = ${}_5C_3(4)^3$ = 640
4032/-32 + 640 = 514

$$r = \sqrt{(-2)^2 + (2\sqrt{3})^2} = 4 \qquad \theta = Tan^{-1}\left(\frac{2\sqrt{3}}{-2}\right) + k\pi = \frac{2\pi}{3} \qquad \left(4cis\left(\frac{2\pi}{3}\right)\right)^{\frac{1}{2}}$$

13.
$$\left(4cis\left(\frac{2\pi}{3}\right)\right)^{\frac{1}{2}} = \sqrt{4}cis\left(\frac{\frac{2\pi}{3}}{2} + \frac{2k\pi}{2}\right) \Rightarrow 2cis\frac{\pi}{3} \text{ and } 2cis\frac{4\pi}{3} \Rightarrow 1+\sqrt{3}i \text{ and } -1+\left(-\sqrt{3}\right)i$$

14. P(not Bill) = 5/6; P(not Bob) = 6/7 P(not Bubba) = 4/5

$$\frac{5}{6}\bullet\frac{6}{7}\bullet\frac{1}{5} + \frac{5}{6}\bullet\frac{6}{7}\bullet\frac{4}{5}\bullet\frac{5}{6}\bullet\frac{6}{7}\bullet\frac{1}{5} + \frac{5}{6}\bullet\frac{6}{7}\bullet\frac{4}{5}\bullet\frac{5}{6}\bullet\frac{6}{7}\bullet\frac{4}{5}\bullet\frac{5}{6}\bullet\frac{6}{7}\bullet\frac{1}{5} + \ldots =$$

P(Bubba making first shot) =
$$\frac{1}{7} + \frac{4}{49} + \frac{16}{343} + \ldots = \frac{\frac{1}{7}}{1-\frac{4}{7}} = \frac{1}{3}$$

15. f^{-1} contains the points (1, -3) and (6, 5). Therefore $0.5f^{-1}$ contains the points (1. – 1.5) and (6, -2.5).

And slope = $\frac{-\frac{5}{2} - \frac{3}{2}}{6-1} = -\frac{4}{5}$

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Precalculus Individual

1. D
2. C
3. A
4. D
5. A
6. A
7. C
8. D
9. B
10. C
11. C
12. A
13. D
14. A
15. B
16, B
17. C
18. D
19. B
20. B
21. D
22. C
23. E
24. A
25. B
26. D
27. E
28. B
29. C
30. B

Team

1. 1,336,336
2. x + 2y = - 3
3. $5\pi/6$
4. $\sqrt{37}$
5. $\sqrt{61}$
6. 16
7. 17.5 35/2
8. 8011
9. 1/15 0.066666666. . .
10. 15/736
11. 3p - 4m
12. 514
13. $1+\sqrt{3}i$ and $-1 - \sqrt{3}i$
14. 1/3
15. – 4/5 - 0.8