

Pre Calculus Bowl

January

1. (C, E) $\sin A \neq \cos(180^\circ - A)$ $BD^2 = x^2 + y^2 - 2xy \cos A$

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

3. $\frac{x}{2x+1} = \frac{x^2}{2x+1}$ $\therefore (\pm \frac{p\sqrt{2}}{8}, 0) (0, \pm \frac{p\sqrt{2}}{8})$

4. $\frac{\sin \theta (\cos \theta + 1) + \sin \theta (\cos \theta - 1)}{\cos^2 \theta - 1} \cdot \frac{\cos \theta - \cos \theta}{\sin \theta} \cdot 4[1 - \cos^2 \theta] \cdot \frac{1}{\cos \theta \sin \theta}$
 $\frac{1 + \sin \theta + 1 - \sin \theta}{\cot^2 \theta} \cdot \frac{\cos^2 \theta - 1}{\sin \theta \cos \theta} \cdot \frac{4 \sin^2 \theta}{\cos \theta \sin \theta} = 2 \tan^2 \theta \cdot (-\tan \theta) \cdot 4 \tan \theta = -8 \tan^4 \theta$

5. $x^4 + 18x^3 + 10x^2 - 90x - 19 = 0$ $(-17.1, -2.7, -2, 2.0)$

6. $m, m-3, m+5$ $(m-3)(m+5) < 0$ $m^2 + 2m - 15 < 0$ $(m+5)(m-3) < 0$
 $-5 < m < 3$ $-8 < m-3 < 0$ $-8 < \text{any number} < 0$ or $(-8, 0)$

7. $\frac{7 \cdot 26 \pi \text{ cm}}{2} \cdot \frac{1 \text{ FT}}{12 \text{ IN}} \cdot \frac{1 \text{ M}}{5280} \cdot \frac{60 \text{ SEC}}{1 \text{ MIN}} \cdot \frac{60 \text{ MIN}}{1 \text{ HR}} = \frac{455 \pi}{88}$

8. $A = \frac{10!}{2!3!3!} = \frac{10 \cdot 9 \cdot 8 \cdot 7 \cdot 6 \cdot 5 \cdot 4}{2 \cdot 4} = 10 \cdot 9 \cdot 7 \cdot 6 \cdot 5 \cdot 2 = 3780$
 $B = \frac{2 \cdot 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1 \cdot 5}{5} = 240$
 $C = \binom{4}{3} \cdot \binom{4}{2} = 4 \cdot 6 = 24$
 $D = \frac{4!}{24} = 1$
 $\frac{3780}{2 \cdot 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1 \cdot 5 \cdot 24} = \frac{7}{96}$

9. $\text{area of semicircle } 2\pi$ $\text{area of } \Delta \frac{1}{2}(4)(4) = 8$ $(8 + 2\pi)$

10. $\frac{(-2, -2\sqrt{3}) - (-\sqrt{3}, 1)}{\sqrt{(-\sqrt{3}+2)^2 + (1+2\sqrt{3})^2}} = \frac{\sqrt{3-4\sqrt{3}+4+1+4\sqrt{3}+12}}{\sqrt{20}} = \frac{\sqrt{20}}{\sqrt{20}} = 1$
 $A = 5\pi$

11. $(-11) + (2) + (0) + (0) + (20) + (24) = 35$

12. $l = \frac{2\pi}{b}$ $b = 2\pi$ $8 = \frac{2\pi}{b}$ $8b = 2\pi$ $b = \frac{2\pi}{8} = \frac{\pi}{4} = 2.5\pi$
 $y = -2.5 \cos 2\pi x$ $y = -2.5 \cos 2.5\pi x$ intersect 6 times from 0 to 3.

13. $y = x^4 - 12x^3 + 70x^2 - 204x + 325$
 $x < -2$ or $x > 4$

14. $A = \{x \mid x > 4\}$ $B = \{x \mid x < -1\}$ $C = \{x \mid x > 2\}$
 $B \cap C = \{x \mid -2 \leq x < -1\}$ $(B \cap C) \cup A = \{x \mid x < -1 \text{ or } x > 2\}$

15. $(4i)^{1/2} = (4 \cos 90^\circ)^{1/2} = 2 \cos 45^\circ = 2(\frac{\sqrt{2}}{2} + i \frac{\sqrt{2}}{2}) = \sqrt{2} + \sqrt{2}i$
 $2 \cos 225^\circ = 2(-\frac{\sqrt{2}}{2} + i \frac{\sqrt{2}}{2}) = -\sqrt{2} + \sqrt{2}i$