Wando High School Math Competition
Precalculus Multiple Choice Test

1) Which angle is coterminal to the complement of 37°
   A. -2663
   B. 2663
   C. –2827
   D. 2827
   E. NOTA

2) What is the area of the section of a circle of diameter 12 in. that is cut out by an angle of 105°?
   A. 42π
   B. $\frac{21\pi}{2}$
   C. 2π
   D. $\frac{7\pi}{4}$
   E. NOTA

3) A rectangle is bounded by the x-axis and the semicircle $y = \sqrt{25 - x^2}$. Write the area of the rectangle as a function of x.
   A. $A(x) = x\sqrt{25 - x^2}$
   B. $A(x) = 2x\sqrt{25 - x^2}$
   C. $A(x) = 2x(25 - x^2)$
   D. $A(x) = x(25 - x^2)$
   E. NOTA

4) For the equation $x^3 - 3 = 0$ which is a root?
   A. $\sqrt{3}$
   B. $-\sqrt[3]{3}$
   C. $\frac{-\sqrt[3]{3}}{2} + \frac{\sqrt[6]{3}}{2}i$
   D. $\frac{\sqrt[3]{3}}{2} + \frac{3i}{2}$
   E. NOTA

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5) Suppose $0 \le \alpha \le \frac{\pi}{2}$ and $\cos(\alpha) = \frac{\sqrt{a}}{2}$. Find the value of $\csc(\alpha)$

A. $2a\sqrt{4-a}$
B. $\sqrt{4-a}$
C. $\frac{\sqrt{4-a}}{2}$
D. $\frac{2\sqrt{4-a}}{4-a}$
E. NOTA

6) What is the probability of drawing 5 straight diamonds from a standard deck of 52 cards without replacement?

A. $\frac{1}{1024}$
B. $\frac{28561}{23990400}$
C. $\frac{33}{66640}$
D. $\frac{1485}{3655808}$
E. NOTA

7) What is the ones digit of the number 7^{2007}

A. 9
B. 7
C. 3
D. 5
E. NOTA

8) Given $f(x) = x^3 - x$, find $\frac{f(x) - f(2)}{x-2}$

A. $x+3$
B. $x^2 + 2x + 3$
C. $3x^2 - 1$
D. $x-3$
E. NOTA

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9) What is the sum of all the roots of the polynomial $f(x) = 6x^3 + 11x - 19x + 6$

A. $\frac{25}{6}$

B. $-\frac{19}{6}$

C. $-\frac{17}{6}$

D. $-\frac{11}{6}$

E. NOTA

10) $\cos(Arc\sin(x+1)) =$

A. $-x$

B. $\sqrt{1-x^2}$

C. $\sqrt{1-x}$

D. $\sqrt{-x^2-2x}$

E. NOTA

11) Find the sum of all the solutions to the equation $|\sin(x)| = 1$ that are in the interval $(-2\pi, 2\pi)$

A. 3π

B. 2π

C. π

D. 0

E. NOTA

12) $\frac{2}{\log_3 a} + \frac{2}{\log_5 a} + \frac{2}{\log_7 a}$

A. $\log_a 840$

B. $\log_{\sqrt{105}} a$

C. $\log_{\sqrt{a}} 105$

D. $\log_a 11025$

E. NOTA

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13) Given the binomial expansion of $(a+b)^n$ where n is a positive integer, which of the following is false:

A. If a term of the expansion is ka^5b^{18}, then $n = 13$
B. The sum of the binomial coefficients is 2^n
C. The coefficient of $a^{n-2}b^2$ is ${}_nC_2$
D. The expansion has a middle term when n is even
E. NOTA

14) Which one of the following functions is odd?

A. $f(x) = \cos(x) + x^2\sqrt{x^2-3}$
B. $f(x) = \cos(-x) + x\sqrt{x^2-3}$
C. $f(x) = \tan(x) + x^2\sqrt{x^2-3}$
D. $f(x) = \tan(-x) + x\sqrt{x^2-3}$
F. NOTA

15) Triangle ABC is an isosceles right triangle with hypotenuse $\overline{AB}$. If $\overline{AC} = \sqrt{2}\tan\theta$ and $\overline{AB} = \sqrt{3}\sec\theta$ for $0 < \theta < 90^\circ$, find the value of θ to the nearest degree. (Note, θ is not an angle in triangle ABC.)

A. 30
B. 45
C. 60
D. 90
E. NOTA

16) Let $f(x) = ax^2 + b\cos(x) + 8x$ be a function such that $f(2) = 20$. Find $f(-2)$.

A. -5
B. -12
C. -18
D. -20
E. NOTA

17) The $\csc(\alpha) = -\frac{4}{3}$ and α is in the III quadrant. What is the value of $\cos(2\alpha)$

A. 1
B. $\frac{7}{16}$
C. $-\frac{1}{8}$
D. $\frac{1}{8}$

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E. NOTA

18) What is the equation of a circle with diameter 8 centered at $(-2,5)$?

A. $(x-2)^2+(y+5)^2=64$
B. $(x+2)^2+(y-5)^2=64$
C. $(x-2)^2+(y+5)^2=16$
D. $(x+2)^2+(y-5)^2=16$
E. NOTA

19) What is the sum of the solutions of the equation $2+\dfrac{1}{1-\dfrac{1}{x}}=x$

A. 4
B. 2
C. –2
D. –4
E. NOTA

20) How many solutions does the equation $7\sin(x)-2\sin(2x)=0$ have that are between $[-4\pi,4\pi]$

A. 0
B. 5
C. 8
D. 9
E. NOTA

21) The function $f(x)$ is quadratic with vertex $(-4,2)$ and an x-intercept at 5. What is the product of the solutions of the equation $f(x)=0$?

A. –20
B. 10
C. 45
D. 65
E. NOTA

22) The rabbit population in a certain forest grows continuously and exponentially. The current population is 166, but the population last year was 128. When will the rabbit population reach 362?

A. 4 years from now
B. 4.5 years from now
C. 3.8 years from now
D. 3.5 years from now
E. NOTA

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23) $\ln(xe^{4x+5}) =$

A. $\ln(x)+4x+5$
B. $x\ln(4x+5)$
C. $\ln(x)+\ln(4x+5)$
D. $x+\ln(4x)+\ln(5)$
E. NOTA

24) Simplify $\dfrac{x!(x-3)!}{(x-2)!(x-1)!}$

A. $\dfrac{x}{x-1}$
B. $\dfrac{x-1}{x-2}$
C. $\dfrac{x^2-x}{x^2-3x-2}$
D. $\dfrac{x}{x-2}$
E. NOTA

25) The function $f(x)$ satisfies the condition $f(x-2)=3x^2+x.$ Find $f(x+3)$

A. $3x^2+31x-60$
B. $3x^2-31x+60$
C. $3x^2+31x+80$
D. $3x^2+31x-80$
E. NOTA

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