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1. Suppose a line has slope 5 and passes through the point $(-1, 10)$. What is the *x* intercept of the line?

A. 15
B. 20
C. -3
D. 3
E. -5

2. Simplify: $\sin\left(\frac{\pi}{2} - x\right) \cdot \sec(x)$

A. 2
B. 1
C. 0
D. 3
E. $\frac{\pi}{2}$

3. A line with slope 2 intersects a line with slope 6 at the point $(20, 30)$. Find the area (in square units) of the triangle bounded by the two lines and the *y* axis.

A. 150
B. 270
C. 1600
D. 2400
E. 800

4. If $\log_x 81 = 4$, find $\log_3 \sqrt{x}$.

A. $\frac{1}{3}$
B. 1
C. 3
D. $\frac{1}{2}$
E. 9

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5. Find the determinant: $\begin{pmatrix} 1 & -6 \\ 2 & 5 \end{pmatrix}$

A. 17
B. –7
C. –17
D. –60
E. 3

6. P is a probability function and E and F are events. If $P(E) = 0.49$, $P(F) = 0.43$ and $P(E \cup F) = 0.74$, what is $P(E \cap F)$?

A. 1.66
B. 0.80
C. 0.68
D. 0.18
E. 0.28

7. The graphs of the two lines $2ax + 4y = 9$ and $4x - \sqrt{a}\, y = 12$ are perpendicular. What is a possible value of *a*?

A. $\frac{1}{2}$
B. $\frac{1}{4}$
C. 2
D. 4
E. 16

8. If $x^2 + y^2 = 10$ and $x^2 - y^2 = 1$, find $|xy|$.

A. $3\sqrt{3}$
B. 5
C. $\frac{3\sqrt{11}}{2}$
D. $\frac{21}{4}$
E. $\frac{5\sqrt{10}}{3}$

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9. Suppose $9x^2+16y^2-18x-64y-71=0$. Find the center, the quadrant 1 vertex and the quadrant 1 focal point. The product of the *x* coordinates of these points is

A. $5+\sqrt{7}$
B. $10+10\sqrt{7}$
C. $5+5\sqrt{7}$
D. $10+\sqrt{7}$
E. 1

10. There are nine members of a student governance committee, with two boys and seven girls as members. The group's adviser wants to take a delegation to a national convention. The delegation must be five or six students and must include at least one boy. How many ways are there to select the delegation?

A. 105
B. 168
C. 147
D. 182
E. 189

11. Suppose $\cot(\alpha)=2$, $\cot(\beta)=\frac{2}{3}$, and $0<\alpha<\beta<\frac{\pi}{2}$. Give the value for $\sec(\alpha+\beta)$.

A. $\frac{\sqrt{65}}{65}$
B. $\frac{7\sqrt{65}}{65}$
C. $\frac{\sqrt{65}}{7}$ 3
D. $\frac{12\sqrt{65}}{65}$
E. $\sqrt{65}$

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12. Evaluate: $\sin\left(\frac{136\pi}{3}\right)+\cos\left(\frac{125\pi}{4}\right)$

A. $\frac{1-\sqrt{2}}{2}$

B. $\frac{\sqrt{3}-\sqrt{2}}{2}$

C. $-\frac{\sqrt{3}+\sqrt{2}}{2}$

D. $-\frac{1+\sqrt{2}}{2}$

E. $\frac{\sqrt{2}-1}{2}$

13. Suppose $a_1 = 4$, $a_2 = 7$, and $a_n = a_{n-1} + 2a_{n-2}$. Find a_6.

A. 117
B. 59
C. 235
D. 114
E. 238

14. How many points of intersection are there for the graphs of the equations in the system below?

$$\begin{cases} \frac{(x-2)^2}{16} - \frac{(y-3)^2}{9} = 1 \\ (x-3)^2 + (y-3)^2 = 25 \end{cases}$$

A. 0
B. 1
C. 2
D. 3
E. 4

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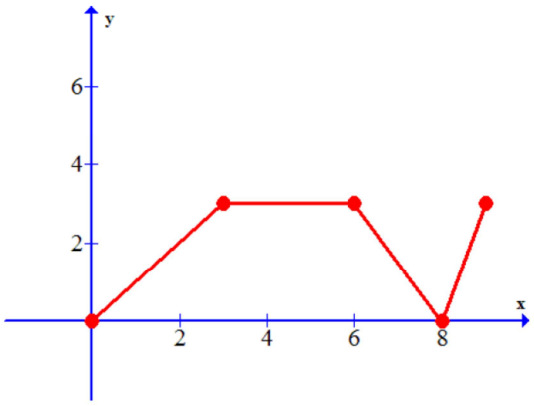
15. Suppose $g(x) = -3f(-x-4)+5$, where $f(x)$ is the graph shown below. Find $g(5)$.



A. $(11, 8)$

B. $(-11, 8)$

C. $(9, -4)$

D. $(9, 14)$

E. $(-9, -4)$

16. Suppose 85 people were asked what flavors of ice cream they like - vanilla, chocolate or strawberry. The respondents could state more than one flavor. Here are the results:

A total of 42 people like vanilla
A total of 43 people like chocolate
A total of 36 people like strawberry
11 like both vanilla and strawberry
14 like both strawberry and chocolate
15 like both vanilla and chocolate
3 like all 3 flavors

How many people responded that they like only chocolate or only vanilla or that they like none of these three flavors?

A. 70
B. 36
C. 37
D. 85
E. 25

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17. If $4^x = 8^y$ and $3^y = 2 \cdot 3^x$, what is *y*?

A. $\frac{-3\ln 2}{\ln 3}$

B. $\frac{-2\ln 2}{\ln 3}$

C. $\frac{\ln 2}{\ln 3}$

D. $\frac{2\ln 3}{\ln 2}$

E. –2

18. If θ is an acute angle and $\sin(\theta) = \frac{3}{5}$, find $\sin(2\theta) + \cos(2\theta)$.

A. $\frac{41}{25}$

B. $\frac{17}{5}$

C. $\frac{17}{25}$

D. $\frac{-1}{5}$

E. $\frac{31}{25}$

19. Find an equation of the perpendicular bisector of the segment with endpoints $(2, 9)$ and $(-6, -1)$ in the form $Ax + By = C$. The sum of *A*, *B* and *C* is

A. –26

B. 26

C. 3

D. 21

E. 24

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20. Using the equation given below, find $a+b+c+x+y+z$.

$$\begin{pmatrix} 1 & a & 3 \\ 2 & -4 & b \\ c & -1 & 7 \end{pmatrix} + \begin{pmatrix} x & 3 & 7 \\ 2 & y & -1 \\ 4 & 3 & -z \end{pmatrix} = \begin{pmatrix} 8 & 3 & 10 \\ 4 & 7 & 2 \\ -3 & 2 & 5 \end{pmatrix}$$

A. 12
B. 16
C. 19
D. 2
E. 30

21. Simplify: $\sqrt{\frac{125 \cdot 5^{2n}}{625 \cdot 5^{3n-1}}}$

A. $\frac{1}{5^n}$
B. $5^{\frac{n}{2}}$
C. $\frac{1}{5^{n+1}}$
D. 5^{n+1}
E. $\frac{1}{5^{\frac{n}{2}}}$

22. Simplify: $\sin(67°)\sin(22°)+\sin(23°)\sin(68°)$

A. 1
B. 2
C. $\frac{1}{2}$
D. $\frac{\sqrt{2}}{2}$
E. $\sqrt{2}$

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23. Suppose $f(x)=5x^3-7x^2+11x+13$. What is the sum of $A+B+C+D$ if $f(x)=A(x+1)^3+B(x+1)^2+C(x+1)+D$.

A. -10
B. 70
C. 22
D. 13
E. -20

24. Simplify: $\sec^3(x)\cot(x)-\sec^5(x)\cot(x)$

A. $\dfrac{-\sin(x)}{\cos^4(x)}$
B. $-\csc^2(x)\sec(x)$
C. $\csc^2(x)\sec(x)$
D. $\tan(x)\csc^3(x)$
E. $\dfrac{\sin(x)}{\cos^4(x)}$

25. Suppose $f(x)=4\cos\left(\dfrac{4\pi}{3}x-\dfrac{\pi}{6}\right)+2$. Find the zeros of the function on $[0,\,2]$.

A. $\dfrac{3}{4}, 1$
B. $\dfrac{11}{8}, \dfrac{15}{8}$
C. $\dfrac{5}{8}, \dfrac{7}{8}$
D. $\dfrac{5}{8}, \dfrac{9}{8}$
E. $\dfrac{3}{4}, \dfrac{5}{4}$

26. Suppose $5^{\cos(\theta)} > 1$ and $3^{\sin(\theta)} < 1$. Which value for θ given below makes both statements true?

A. 18°
B. 88°
C. 158°
D. 228°
E. 298°

27. A city held an election on two bond issues. One hundred fifty voters were surveyed after voting. Of them, 78 voters supported the bridge bonds, 96 supported the sewer bonds and 49 supported both. What is the probability that a randomly selected voter who was surveyed voted for neither issue?

A. $\frac{49}{150}$
B. $\frac{47}{150}$
C. 0
D. $\frac{1}{6}$
E. $\frac{1}{8}$

28. In triangle ABC, $m\angle A = 2x$, $AB = 5$, $AC = \frac{\sqrt{6}}{4}$ and $\sin(x) = \frac{1}{5}$. Find the area of the triangle.

A. $\frac{1}{4}\sqrt{6}$ square units
B. $\frac{6}{5}$ square units
C. $\frac{3}{5}$ square units
D. $\frac{5}{6}\sqrt{8}$ square units
E. $\frac{3}{10}$ square units

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29. A Ferris wheel completes a revolution in 80 seconds and has a diameter of 200 feet. At its lowest point, the wheel is two feet above ground. Shasta, the UH mascot, is strapped into the seat at the bottom of the ride, and then the ride begins immediately. How far from the ground is Shasta 25 seconds after the ride begins?

A. $50\sqrt{2-\sqrt{2}}+102$ feet

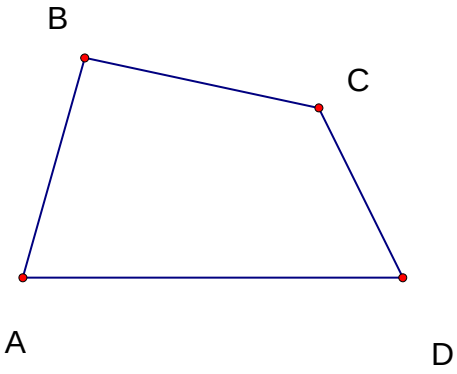
B. $50\sqrt{2+\sqrt{2}}+102$ feet

C. $50\sqrt{1-\sqrt{2}}+102$ feet

D. $50\sqrt{1+\sqrt{2}}+102$ feet

E. $50\sqrt{3-\sqrt{2}}+102$ feet

30. In the figure given below, ΔABC is isosceles, $m\angle B=120°$, $m\angle C=135°$ and $m\angle D=45°$ and $CD=16$. Find the perimeter of the quadrilateral. (Figure is not drawn to scale.)



A. $\frac{56\sqrt{6}}{3}+8\sqrt{3}+16$

B. $\frac{49\sqrt{6}}{3}+8\sqrt{2}+16$

C. $\frac{40\sqrt{6}}{3}+8\sqrt{2}+16$

D. $\frac{56\sqrt{6}}{3}+8\sqrt{2}+16$

E. $16\sqrt{6}+8\sqrt{2}+16$