ADVANCED MATH TEST 3

Name_____ Date_____

Directions: You have 30 minutes. No calculators! Some questions may require more than one answer.

1. What is the *x* coordinate of the vertex for $x=-3y^2+5y-\frac{2}{36}$?

(**A**) $-\frac{77}{36}$ (**B**) $-\frac{51}{18}$ (**C**) 2 (**D**) $\frac{49}{18}$ (**E**) $\frac{73}{36}$

2. A line passes through $(16,-4)$ and has a slope of $-\frac{7}{4}$. Find the value of $\frac{2}{3}\left(y+\frac{7}{4}x\right)$.

(**A**) -6 (**B**) $-\frac{64}{3}$ (**C**) $\frac{64}{3}$ (**D**) 6 (**E**) 16

3. $l_1 \perp l_2$, $l_1 \| l_3$, and the equation of l_2 is $5x-3y=78,456$. Using the equation for l_3 that goes through $(5,000,-2,000)$, find the value of $y+\frac{3}{5}x-8,000$.

(**A**) $-9,000$ (**B**) $-8,000$ (**C**) $-7,000$ (**D**) $-6,000$ (**E**) $-5,000$

4. If $y=jx+10$ is a linear equation that goes through $(5,-240)$ and $(12,c)$. Find *c*.

(**A**) -610 (**B**) -590 (**C**) -564 (**D**) -542 (**E**) -532

5. If each leg of an isosceles triangle has a length of 10 and the altitude to the base is 6, what is the perimeter of the triangle?

(**A**) 28 (**B**) 33 (**C**) 34 (**D**) 35 (**E**) 36

6. The width of a large square is $3x+2$ and the perimeter of a small square is $8x-8$. Find the difference between the two areas.

(**A**) $5x^2+4x-16$ (**B**) $5x^2+4x+8$ (**C**) $5x^2+4x$ (**D**) $5x^2+20x+8$ (**E**) $5x^2+20x$

7. Simplify $\frac{8x^3-27}{\left(4x^3+6x^2+9x\right)\left(4x^2-9\right)}\cdot x^4(2x+3)$

(**A**) x^3 (**B**) x^4 (**C**) x^5 (**D**) $x^4(2x-3)$ (**E**) $x^5(2x-3)$

8. Solve $6(x-y)^2-11(x-y)-2<0$ for *x*.

(**A**) $y-2<x<y+\frac{1}{6}$ (**B**) $y+\frac{1}{6}<x<y+2$ (**C**) $y+\frac{1}{6}<x<y-2$ (**D**) $y-\frac{1}{6}<x<y+2$ (**E**) $y+2<x<y+\frac{1}{6}$

9. When solving $-5x^2-9x-3=0$ by completing the square, what would $\left(x+\frac{9}{10}\right)^2$ equal?

(**A**) $\frac{66}{25}$ (**B**) $\frac{96}{25}$ (**C**) $\frac{17}{100}$ (**D**) $\frac{21}{100}$ (**E**) $\frac{141}{100}$

10. Which of the following is $\left(a\sqrt{b}-a\sqrt{d}\right)\left(a\sqrt{b}+a\sqrt{d}\right)$ equivalent to assuming $d-b=-3$?

(**A**) $-3a^2$ (**B**) $-2a^2$ (**C**) 0 (**D**) $2a^2$ (**E**) $3a^2$

11. What is the area of a 30-60-90 degree triangle if the hypotenuse has a length of 12?

(**A**) $18\sqrt{2}$ (**B**) $36\sqrt{2}$ (**C**) $18\sqrt{3}$ (**D**) $36\sqrt{3}$ (**E**) 108

12. ΔABC where $BC=4$, $AC=5$, and $m\angle B=90^\circ$. Which of the following is the smallest?

(**A**) $\tan A$ (**B**) $\cos C$ (**C**) $\cos A$ (**D**) $\tan C$ (**E**) $\sin A$

13. What type of roots does $-5x^3-3x=9x^2$ have?

(**A**) 2 real and 2 complex (**B**) 3 complex (**C**) 2 real and 1 complex (**D**) 1 real and 2 complex (**E**) 3 real

14. When the largest of 4 consecutive multiples of 4 is doubled, it becomes 8 less than the smallest. Find the sum of the smallest and largest.

(**A**) -52 (**B**) -48 (**C**) -36 (**D**) -25 (**E**) -24

15. For a trapezoid, the nonparallel sides have lengths $3\sqrt{5}$ and $7\sqrt{2}$, the bases have lengths of $2\sqrt{5}$ and $3\sqrt{10}$, and half the height is $8\sqrt{5}$. Find the area.

(**A**) $40+60\sqrt{2}$ (**B**) $80+120\sqrt{2}$ (**C**) $16\sqrt{5}+120\sqrt{2}$ (**D**) $80+48\sqrt{5}$ (**E**) $160+240\sqrt{2}$

16. Solve $-3\log_x 2=-\frac{3}{5}$.

(**A**) 1 (**B**) 32 (**C**) -32 (**D**) $\frac{1}{32}$ (**E**) $-\frac{1}{32}$

17. Which choice is equivalent to

$$4\sqrt{b+c}\sin\left(\frac{x_1}{x_3}\right)\cos\left(\frac{x_2}{x_1}\right)-4\sqrt{b+c}\sin\left(\frac{x_2}{x_3}\right)\cos\left(\frac{x_2}{x_1}\right)-4\sqrt{b+c}\cos\left(\frac{x_1}{x_3}\right)\sin\left(\frac{x_2}{x_1}\right)+4\sqrt{b+c}\sin\left(\frac{x_2}{x_3}\right)\cos\left(\frac{x_2}{x_1}\right)\ ?$$

(**A**) $-4\sqrt{b+c}\sin\left(\frac{x_2x_3-x_1^{\,2}}{x_3x_1}\right)$ (**B**) $4\sqrt{b+c}\sin\left(\frac{x_2x_3-x_1^{\,2}}{x_3x_1}\right)$ (**C**) $-4\sqrt{b+c}\sin\left(\frac{x_2x_3+x_1^{\,2}}{x_3x_1}\right)$

(**D**) $4\sqrt{b+c}\sin\left(\frac{x_2x_3+x_1^{\,2}}{x_3x_1}\right)$ (**E**) $4\sqrt{b+c}\sin\left(\frac{x_2x_3+x_1^{\,2}}{-x_3x_1}\right)$

18. Which of the following satisfy $-2\cos^2 x+\sin x+1=0$?

(**A**) 30° (**B**) 300° (**C**) 150° (**D**) 180° (**E**) 240°

19. Simplify $\left[(\ln e)^2-\sec^2 v-\cos^2 270^\circ\right](1+\cos 2v)-\cos 2v$

(**A**) $-\cos 2v$ (**B**) $\cos 2v$ (**C**) 1 (**D**) 0 (**E**) -1

20. Simplify $\dfrac{5+5\sin\left(\frac{\pi}{2}+x\right)-11}{3}+\dfrac{10\sin^2\frac{x}{2}}{3}+\dfrac{2}{3}$

(**A**) -1 (**B**) $-\frac{2}{3}$ (**C**) $\frac{1}{3}$ (**D**) $\frac{2}{3}$ (**E**) 1

21. The average of $-6a^6b^9$, $-12a^9b^6$, and c is $-8a^6b^9-4a^9b^6$. Find the value of c.

(**A**) $-30a^6b^9$ (**B**) $-24a^6b^9$ (**C**) $-18a^6b^9$ (**D**) $-12a^6b^9$ (**E**) $-6a^6b^9$

22. Given $(a+b+c)^3-8(a+b+c)^2+12(a+b+c)=0$. Find the value of $a+b$. Assume $a+b+c\neq 6$ or 0.

(**A**) $2-c$ (**B**) $2+c$ (**C**) $-2-c$ (**D**) $-2+c$ (**E**) $-6-c$

23. Which is an equivalent equation to $4x^2+3y^2+30x+36y-40=6y^2-2x+16$?

(**A**) $\frac{(x+6)^2}{3}-\frac{(y-4)^2}{4}=1$ (**B**) $\frac{(x+6)^2}{3}-\frac{(y-4)^2}{4}=1$ (**C**) $\frac{(x+4)^2}{3}-\frac{(y+6)^2}{4}=1$

(**D**) $\frac{(x+4)^2}{4}-\frac{(y+6)^2}{3}=1$ (**E**) $\frac{(x+4)^2}{3}-\frac{(y-6)^2}{4}=1$

24. Simplify $\left(i^{\cos 90^\circ+\ln e-\sin 270^\circ-6{,}573}\right)\left(i^{\sin 30^\circ}\right)^4$.

(**A**) $-i$ (**B**) 0 (**C**) -1 (**D**) i (**E**) 1

25. Which of the following satisfies $\log\left(4x^3-8x^2-9x-2\cos 60^\circ+20\right)=\ln 1$?

(**A**) 2 (**B**) $\frac{3}{2}$ (**C**) $\frac{1}{3}$ (**D**) $-\frac{2}{3}$ (**E**) $\frac{2}{3}$

ADVANCED MATH TEST 3 ANSWERS

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

1. $x=-3\left(y-\frac{5}{6}\right)^2+\frac{73}{36}$
2. $y+\frac{7}{4}x=24\rightarrow\frac{2}{3}\left(y+\frac{7}{4}x\right)=16$
3. $y+\frac{3}{5}x=1000\rightarrow y+\frac{3}{5}x-8000=-7000$
4. $\frac{c+240}{12-5}=-50\rightarrow c=-590$
5. $10+10+16=36$
6. $9x^2+12x+4-4x^2+8x-4=5x^2+20x$
7. x^3
8. $-\frac{1}{6}<x-y<2\rightarrow y-\frac{1}{6}<x<y+2$
9. $\frac{21}{100}$
10. $a^2b-a^2d=a^2\left(b-d\right)=3a^2$
11. $\frac{1}{2}\cdot6\cdot6\sqrt{3}=18\sqrt{3}$
12. $\cos A$
13. 3 real
14. $-30-20=-52$
15. $8\sqrt{5}\left(2\sqrt{5}+3\sqrt{10}\right)=80+120\sqrt{2}$
16. $x^{-\frac{3}{5}}=\frac{1}{8}\rightarrow x^{-\frac{3}{5}}=2^{-3}\rightarrow\left(x^{-\frac{3}{5}}\right)^{-\frac{5}{3}}=\left(2^{-3}\right)^{-\frac{5}{3}}\rightarrow x=32$
17. $a\left(\sin p\cos q-\cos p\sin q\right)=a\sin\left(p-q\right)=4\sqrt{b+c}\sin\left(\frac{x_1}{x_3}-\frac{x_2}{x_1}\right)=4\sqrt{b+c}\sin\left(\frac{x^2_1-x_2x_3}{x_3x_1}\right)=-4\sqrt{b+c}\sin\left(\frac{x_2x_3-x^2_1}{x_3x_1}\right)$
18. $-2\left(1-\sin^2x\right)+\sin x+1=0\rightarrow2\sin^2x+\sin x-1=0\rightarrow\left(2\sin x-1\right)\left(\sin x+1\right)=0\rightarrow x=30,\,150,\,270$
19. $\left(1-\sec^2v\right)\left(1+\cos2v\right)-\cos2v=-\tan^2v\left(1+\cos2v\right)-\cos2v=-\left(1-\cos2v\right)-\cos2v=-1$
20. $\frac{5+5\cos x-11}{3}+\frac{10\left(\frac{1-\cos x}{2}\right)}{3}+\frac{2}{3}=\frac{5+5\cos x-11+5-5\cos x+2}{3}=\frac{1}{3}$
21. $c=-18a^6b^9$
22. $x\left(x-2\right)\left(x-6\right)=0\rightarrow a+b+c=2\rightarrow a+b=2-c$
23. $4\left(x^2+8x+16\right)-3\left(y^2-12y+36\right)=56+64-108\rightarrow4\left(x+4\right)^2-3\left(y-6\right)^2=12\rightarrow\frac{\left(x+4\right)^2}{3}-\frac{\left(y-6\right)^2}{4}=1$
24. $i^{-6569}=i^{-1}=-i$
25. $4x^3-8x^2-9x-1+20=1\rightarrow4x^2\left(x-2\right)-9\left(x-2\right)=0\rightarrow\left(4x^2-9\right)\left(x-2\right)=0\rightarrow x=\pm\frac{3}{2},\,2$