Math 3 Midterm Quiz Bowl

You MUST do your work on your own paper, which you will turn in. All answers must be agreed upon by the whole group and recorded on the Quiz Bowl answer sheet. First attempt correct answers receive 2 points, and second attempt correct answers receive 1 point. The goal is to be the top earning group with the most points.

1. How many of the following statements are true?

   - $x+1$ is a factor of $2x^{10}-x^7-1$.
   - The remainder for $(2x^{10}-x^7-1)\div(x+1)$ is 0.
   - If $P(x)=2x^{10}-x^7-1$ then $P(-1)=0$.

   A. 1

   B. 3

   C. 0

   D. cannot be determined

2. Express the following complex number in standard form.

   $$\frac{7-4i}{2-3i}$$

   A. $2+i$ B. $2-i$ C. $1+i$ D. $1-i$

3. Subtract and simplify: $\dfrac{2x+8}{x^2+6x+8}-\dfrac{x+16}{x^2+8x+12}$

   A. $\dfrac{x-8}{-2x-4}$ C. $\dfrac{x-8}{(x+4)(x+6)}$

   B. $\dfrac{x-4}{(x+2)(x+6)}$ D. $\dfrac{-x-14}{(x+2)(x+6)}$

4. The polynomial $a^2-11a+2ab-22b$ can be factored into $a-11$ and what other polynomial?

   A. $a+2b$ C. $(a+2b)^2$

   B. $2(a+2b)$ D. $a(a+2)$

5. Let $f(x)=\dfrac{(2x+1)}{(x-1)}$, then find $f^{-1}(3)$.

   A. 2 B. 4 C. 3.5 D. -2

6. Given the quadratic equation $x^2-3x+1=0$, what is x?

   A. $\dfrac{-3\pm\sqrt{5}}{2}$ C. $\dfrac{3\pm\sqrt{13}}{2}$

   B. $\dfrac{3\pm\sqrt{5}}{2}$ D. $1.5\pm\sqrt{2.25}$

7. When x^3+216 is factored completely, what is one of the factors?

   A. $x^2+36x+36$ C. $x^2+6x-36$

   B. $x^2-6x+36$ D. $x-6$

8. Let b be a positive integer and consider $f(x)=2x^2+bx+10$. As b increases, how does the graph of $f(x)$ change?

   A. The vertex changes with the x-coordinate decreasing at a slower rate than the y-coordinate

   B. The vertex changes with the x-coordinate decreasing while the y-coordinate remains constant.

   C. The x-coordinate of the vertex decreases by 1 whenever the y-coordinate of the vertex decreases by 4.

   D. None of these.

9. What is the domain of the function?

   $$f(x)=5+\frac{4}{3-x}-1$$

   A. $(-\infty,\ \infty)$ C. $(-\infty,-3)\cup(-3,\infty)$

   B. $(-\infty,3)\cup(3,\infty)$ D. $(-\infty,5)\cup(5,\infty)$

10. If $2^{x+2y}=32$ and $2^{2x+3y}=256$, what is 2^{y-x}?

    A. 1 B. 2 C. 8 D. 16

11. Factor completely: $15x^2 + 31xy + 14y^2$. Then, identify one of the following as an incomplete version of the correctly factored form.

A. $(\quad)(2x-\quad)$ C. $(\quad-10y)(\quad)$

B. $(3x+\quad)(\quad)$ D. $(\quad)(\quad+5y)$

12. A sample of antifreeze was removed from a radiator shortly after a car engine was turned off. Temperature data was collected and recorded in the table. Which equation best models antifreeze temperature (y) versus time (t)?

Time (hours)	Temp. (°F)
0.3	215
0.7	160
1.1	130
1.8	100
2.5	83
3.0	77

A. $y = 250(2^t) - 70$ C. $y = 200(3^{-t}) + 70$

B. $y = 250(2^{-t}) + 20$ D. $y = 200(3^t) - 20$

13. Find a polynomial $P(x)$ of least degree with real coefficients that has $2 + i$ as a zero and $P(-1) = 5$.

A. $x^2 - 4x + 5$

B. $0.5x^2 - 2x + 2.5$

C. $0.625x^2 - 2.5x + 1.875$

D. $x^2 - 4x + 3$

14. Solve: $|5x - 2| > 8$

A. $\left(-\infty, -\frac{6}{5}\right],\ [2, \infty)$ C. $\left[-\frac{6}{5}, 2\right]$

B. $\left(-\infty, -\frac{6}{5}\right),\ (2, \infty)$ D. $\left[-\frac{6}{5}, 2\right)$

15. Which of the choices shows an extraneous root of $\frac{6x}{2x-1} = \frac{2x+1}{x-1} - \frac{4x-5}{2x-1}$?

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

16. What are the values of x in the equation shown?

$$-4\,|5x - 2| = -20$$

A. $-\frac{22}{5}, \frac{22}{5}$ C. $-\frac{18}{5}, \frac{22}{5}$

B. $-\frac{11}{10}, \frac{11}{10}$ D. $-\frac{3}{5}, \frac{7}{5}$

17. The graph below shows y as a function of x.

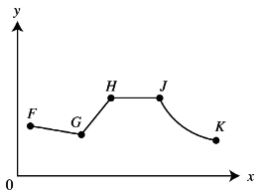
Between which two labeled points is the function increasing?

A. F and G

B. G and H

C. H and J

D. J and K



18. A function f is one-to-one if both it AND it's inverse is a function.

Which of the following is a one-to-one function?

A. $x = -5$ C. $h(x) = x^2 + x$

B. $G(x) = \sqrt{x^2 - 25}$ D. $F(x) = 2log(x + 1)$

19. Suppose Jerry Richardson, owner of the Carolina Panthers, gives \$1,000,000 to help out the homeless of Charlotte. If the entire amount is invested at 7% compounded continuously, how many years will it take for the investment to equal \$1,500,000?

A. 1.5 yrs. C. 5.0 yrs.

B. 3.0 yrs. D. 5.8 yrs.

20. Combine as one logarithm: $\log xy + 2\log x - \log y - \log \frac{x}{y}$. The result is:

A. $\log \frac{x}{y^2}$ C. $\log x^2 y$

B. $\log \frac{y}{x^2}$ D. none of the above