

No electronic devices or calculators allowed. Show all of your work on this test paper. Put answers in the blanks provided. This exam has 33 questions worth 200 points. The point values of each question are shown in the left margin in [brackets].

- [4] 1. Factor completely. If the polynomial cannot be factored, say it is prime.

$$x^3 - 8$$

1. _____

- [4] 2. Factor completely. If the polynomial cannot be factored, say it is prime.

$$64y^2 - 25$$

2. _____

- [4] 3. Factor completely. If the polynomial cannot be factored, say it is prime.

$$3x^2 + 5x - 2$$

3. _____

- [4] 4. Simplify the expression.

$$9\sqrt[3]{24} - \sqrt[3]{81}$$

4. _____

- [4] 5. Simplify the radical.

$$\sqrt{720}$$

5. _____

[10] 6. Simplify the expression. Factor any polynomial appearing in your answer.

$$\frac{\frac{1}{2} + \frac{3}{x}}{\frac{x+3}{4}}$$

6. _____

[6] 7. Simplify the expression. Express your answer so that only positive exponents occur.

$$\left(\frac{9x^2y}{x^{1/3}y^5}\right)^{-1/2}$$

7. _____

[6] 8. Solve the equation.

$$\frac{x}{x+2} = \frac{3}{2}$$

8. _____

[6] 9. Solve the equation.

$$(5w - 2)^{1/3} = 2$$

9. _____

[6] 10. Solve the equation.

$$6x - 5 = \frac{6}{x}$$

10. _____

[6] 11. Solve the equation.

$$|2y + 3| = 5$$

11. _____

[6] 12. Solve each inequality and write your answer using interval notation.

$$|1 - 4x| < 5$$

12. _____

[6] 13. Find the distance between the points $A(4, -3)$ and $B(6, -7)$ and simplify your answer.

13. _____

[8] 14. Consider the equation $x^2 - y - 4 = 0$.

(a) Find all x -intercepts on the graph. If none, write "none."

(a) _____

(b) Find all y -intercepts on the graph. If none, write "none."

(b) _____

[5] 15. Multiply the complex numbers and write your answer in standard form $a \pm bi$:

$$(8 + 4i) \cdot (5 + 5i)$$

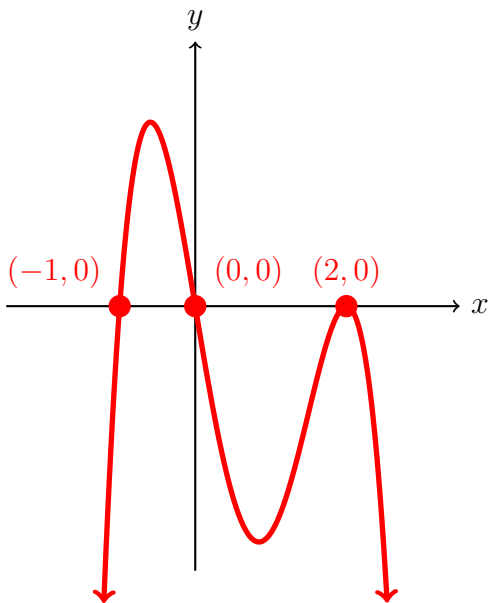
15. _____

[6] 16. Find all real and complex solutions and simplify:

$$x^2 + 12x + 40 = 0$$

16. _____

[5] 17. Find the polynomial of smallest degree whose graph matches the graph displayed below. Circle your answer.



A. $y = 2x(x + 2)^2(x - 1)$

B. $y = -2x(x + 2)^2(x - 1)^2$

C. $y = -\frac{3}{2}x(x - 2)^2(x + 1)$

D. $y = -3x^2(x - 2)(x + 1)^2$

E. $y = \frac{2}{3}x^3(x - 2)^2$

F. None of these

[6] 18. Find the slope-intercept equation of the line passing through $(-3, 6)$ and $(2, 1)$.

18. _____

[8] 22. The monthly cost C , in dollars, for cell phone calls from the United States to Canada on a popular phone plan is modeled by the function $C(x) = 0.15x + 4$, where x is the number of minutes used.

(a) What is the cost of using 100 minutes?

(a) _____

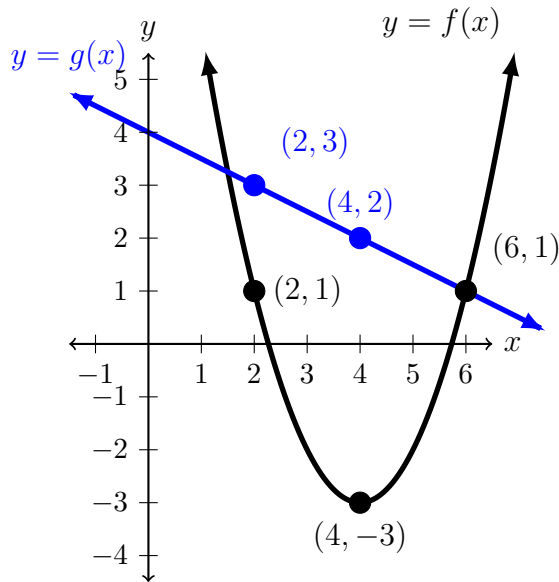
(b) If the bill was \$7, how many minutes were used?

(b) _____

[6] 23. Find the equation of the quadratic function with vertex $(1, -5)$ and y -intercept is -3 .

23. _____

- [8] 24. The graph below displays a linear function $y = g(x)$ and a quadratic function $y = f(x)$. Use the graph to answer the questions.



(a) When is $g(x) = 1$?

(a) _____

(b) Find $(g - f)(4)$

(b) _____

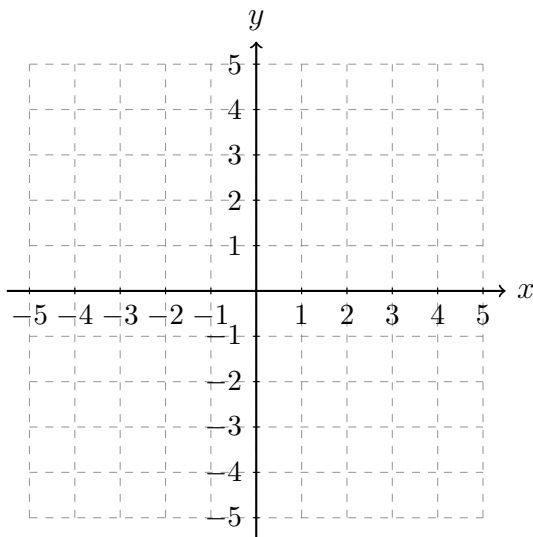
(c) Find $\left(\frac{f}{g}\right)(4)$

(c) _____

(d) Find $(f \circ g)(4)$

(d) _____

- [6] 25. Graph the line $3x - 4y + 12 = 0$ and label any intercept that appears on your graph.



- [8] 26. Suppose $R(x) = \frac{3x + 5}{x - 6}$.

(a) Write the **equation** of any horizontal asymptote appearing on the graph of $y = R(x)$.
If none exist, write "none."

(a) _____

(b) Write the **equation** of any vertical asymptote appearing on the graph of $y = R(x)$.
If none exist, write "none."

(b) _____

- [8] 27. Solve the inequality. Express your answer using interval notation. You must show work to support your answer.

$$\frac{x-3}{x+1} \geq 0$$

27. _____

- [6] 28. Suppose that $f(x) = x^2 + 3x - 1$ and $g(x) = 2x + 3$. Find the composite function $f \circ g$ and write the answer in standard form.

28. _____

- [8] 29. For the function $f(x)$, find the inverse function $f^{-1}(x)$:

$$f(x) = \frac{4}{x} - 2$$

29. _____

[4] 30. Simplify: $\left(\frac{1}{100}\right)^{-3/2}$

30. _____

[4] 31. Convert $2^{rk} = P$ to logarithmic form.

31. _____

[8] 32. Solve the equation:

$$25^{2x} = 5^{x^2-12}$$

32. _____

[4] 33. Find the exact value of $\log_2(64)$.

33. _____

Please do not write in the box below.

Page:	1	2	3	4	5	6	7	8	9	10	Total
Points:	20	22	18	25	17	20	14	22	22	20	200
Score:											