Mathematics 3200
Unit 1 Test

Name: _____

Part A: Place the letter corresponding to the correct answer to each of the following in the blank at the right.

1. Which of the following is **not** a polynomial function?   1. _____

   (A) $f(x) = x^4 - 3x^3 + \sqrt{2}\, x$ (B) $f(x) = 5x^4 + 4x^2 + \pi$

   (C) $f(x) = \dfrac{x^4}{2} - \dfrac{x^3}{6} + 3x - 6$ (D) $f(x) = 3x^3 - 4x^2 - \dfrac{2}{x}$

2. What is the restriction on x when $2x^3 + 3x^2 - 6x$ is divided by $2x - 1$?   2. _____

   (A) $x \neq -1$ (B) $x \neq -\dfrac{1}{2}$

   (C) $x \neq \dfrac{1}{2}$ (D) $x \neq 1$

3. Given a polynomial function $P(x)$ where $P(-5) = 0$, which is a factor?   3. _____

   (A) -5   (B) 5
   (C) $x - 5$ (D) $x + 5$

4. What is the maximum number of real roots that a cubic function can have?   4. _____

   (A) 1   (B) 2
   (C) 3   (D) infinitely many

5. What is the remainder when $-2x^3 - 3x^2 + 6x - 5$ is divided by $x + 1$?   5. _____
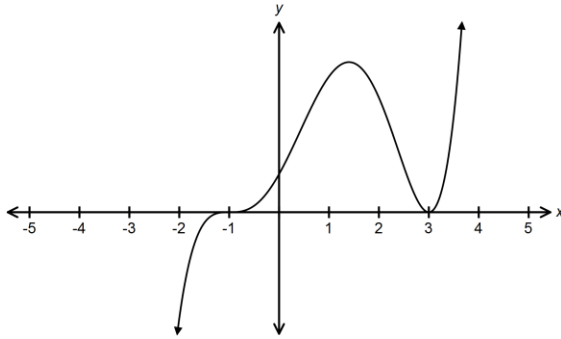
   (A) -15   (B) -12
   (C) -10   (D) -4

6. Determine the value of **k** if $x+2$ is a factor of $x^3 + 10x^2 + 23x + k$.

6. _____

(A) -14   (B) -1
(C) 1   (D) 14

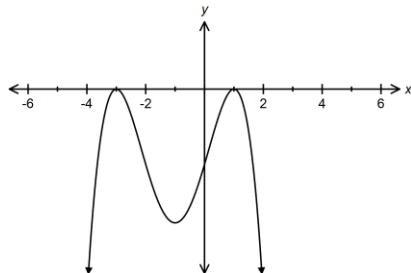7. Given the graph below, which is true for the polynomial function?

7. _____

	Degree	Value of leading Coefficient
(A)	3	negative
(B)	3	positive
(C)	5	negative
(D)	5	positive

8. What are the possible integral zeros for $f(x) = 3x^3 - 8x^2 + 5x - 35$?

8. _____

(A) $\{\pm 1, \pm 3\}$ (B) $\{3, -8, 5, -35\}$

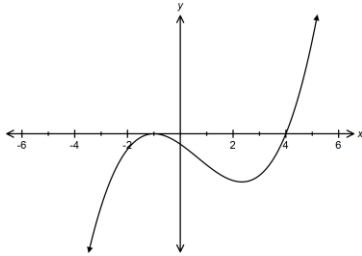(C) $\{1, 5, 7, 35\}$ (D) $\{\pm 1, \pm 5, \pm 7, \pm 35\}$

9. Which polynomial function best describes the graph below?
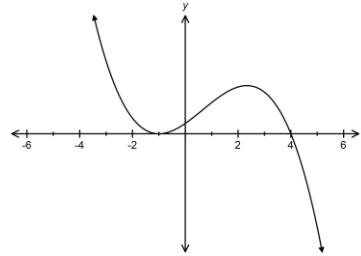
9. _____

(A) $f(x) = -(x+3)^2(x-1)^2$ (B) $f(x) = -(x-3)^2(x+1)^2$

(C) $f(x) = (x+3)^2(x-1)^2$ (D) $f(x) = (x-3)^2(x+1)^2$

10. Which of the following graphs has a multiplicity of 2 at x = -1, a single root at x = 4   10. ____
    and a negative leading coefficient.
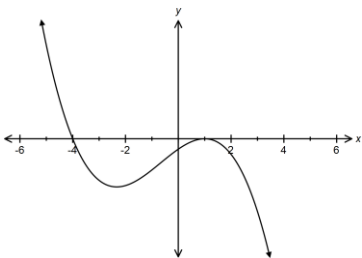
(A)   (B)
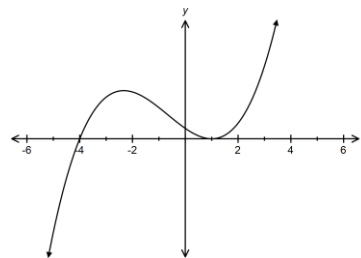

(C)   (D)

11. What are the x intercepts of the graph of the function $f(x) = 2x^3 + 3x^2 - 2x - 3$?   11. ____

(A) $\left\{-\dfrac{3}{2}, -1, 1\right\}$ (B) $\left\{-\dfrac{3}{2}, 1, 1\right\}$

(C) $\left\{-1, -1, \dfrac{3}{2}\right\}$ (D) $\left\{-1, 1, \dfrac{3}{2}\right\}$

12. Which polynomial equation has a single root at $x = -3$ and a double root at $x = 2$?   12. ____

(A) $x^3 - 4x^2 - 3x + 18 = 0$ (B) $x^3 - x^2 - 8x + 12 = 0$
(C) $x^3 + x^2 - 8x - 12 = 0$ (D) $x^3 - 4x^2 - 3x - 18 = 0$

13. Which of the following is a factor of the function $f(x) = x^3 - 4x^2 - x + 4$?   13. ____

(A) $x - 4$ (B) $x - 2$
(C) $x + 2$ (D) $x + 4$

14. If $2x^3 - 5x + 6$ is divided by $x - 1$, which of the following is true?　　14. ____

(A) $(x-1)(2x^2 - 3x) + \dfrac{3}{x-1} = 2x^3 - 5x + 6$

(B) $(x-1)(2x^2 + 2x - 3) + \dfrac{3}{x-1} = 2x^3 - 5x + 6$

(C) $(x-1)(2x^2 - 2x - 3) + \dfrac{9}{x-1} = 2x^3 - 5x + 6$

(D) $(x-1)(2x^2 + 2x - 3) + \dfrac{-9}{x-1} = 2x^3 - 5x + 6$

15. Given the table below, when is $P(x) > 0$?　　15. ____

	X < -1	-1 < x < 2	2 < x < 3	X > 3
x– 2				
x + 1				
x - 3				
P(x)				

(A) $x < -1, \quad x > 3$ 　　　　　　(B) $-1 < x < 2, \quad x > 3$
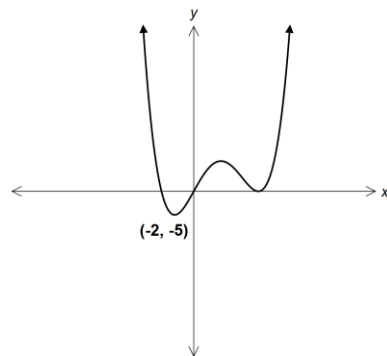
(C) $x < -1, \quad 2 < x < 3$ 　　　　(D) $-1 < x < 2, \quad 2 < x < 3$

16. What is the range of the function graphed below ?　　16. ____

(-2, -5)

(A) $\{x / x \geq -2, x \in R\}$ 　　　　　(B) $\{x / x \geq -5, x \in R\}$
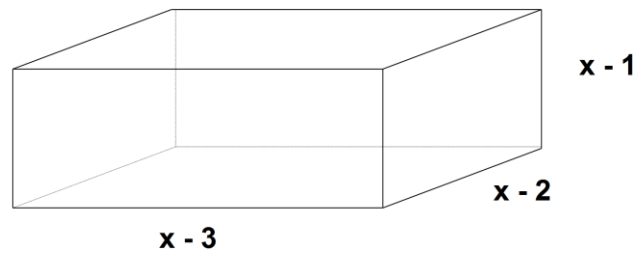
(C) $\{y / y \geq -2, y \in R\}$ 　　　　　(D) $\{y / y \geq -5, y \in R\}$

Part B: Answer each question and show all workings.

1. Factor $2x^3 - 7x^2 + 2x + 3$ completely.

2. Solve $x^3 - 5x^2 + 7x - 2 = 0$ leaving roots in exact simplest form.
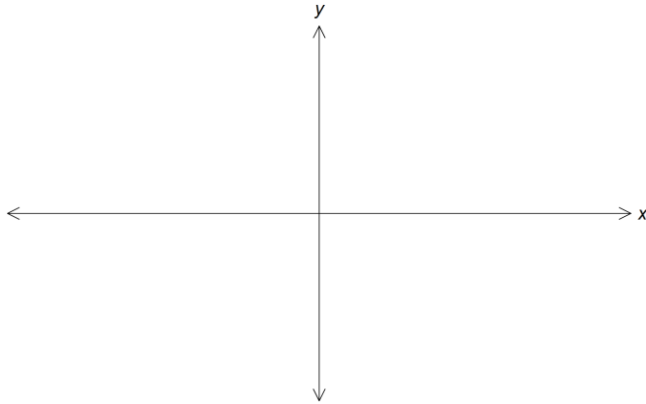
3. The dimensions of a rectangular solid are shown.

(a) Write an expression for the volume in the form $f(x) = ax^3 + bx^2 + cx + d$

(b) What are the inadmissible values for x?

(c) If the volume of the solid is 60 cm^2, what is the dimension of the solid?

4. Sketch the graph of $f(x) = -x^3 + 3x^2 - 4$ clearly labeling the x intercept(s) and y intercept.

5. Write the equation for the graph of the polynomial function below.