Bishop's University

Math 190: Final Exam
Winter 2019

Name: _____

Student #: _____

- Prepare neat solutions. Briefly justify your work, that is, *make your reasoning clear.*
- All answers must be exact (no decimals allowed) unless specifically directed otherwise.
- Do not remove any pages from this test.
- The back of each page may be used for scrap paper.
- This exam is 180 minutes in length.
- A **Casio fx260-solar** or **Casio fx260-solar II** calculator is permitted. No other aids are permitted.
- **Remember that Bishop's University has a ZERO-TOLERANCE POLICY for academic misconduct on final exams.**

Page	Points	Score
2	15	
3	15	
4	20	
5	15	
6	15	
7	15	
Total:	95	

1. (5 points) Write 30213_4 in base 10.

2. (5 points) Write 8197 in base 7.

3. (5 points) Multiply 654_7 and 32_7, writing the answer in base 7. You may use the standard algorithms.

4. (5 points) Rationalize the denominator of $\dfrac{2}{5-\sqrt{11}}$.

5. (5 points) Simplify the following, if possible. Avoid all radicals and negative exponents. All fractions must be in reduced form. Brackets must be removed. Like terms must be combined.

$$\frac{(-5x^4y^3z)^{-2}\,(x^2yz^{-2})^3}{(y^2z^3)^2(2xy^2z)^{-4}}$$

6. (5 points) Write as a single fraction and simplify:

$$\frac{1}{2x-1}+\frac{1}{\left(\dfrac{x}{3}+\dfrac{1}{6}\right)}.$$

7. Expand the following and simplify (remove brackets and combine like terms)

   (a) (5 points) $(2-x)^3$

   (b) (5 points) $(x+3)^2(x-3)^2$

8. Completely factor the following

   (a) (5 points) $q^2-5q-24$

   (b) (5 points) t^4-20t^2+64

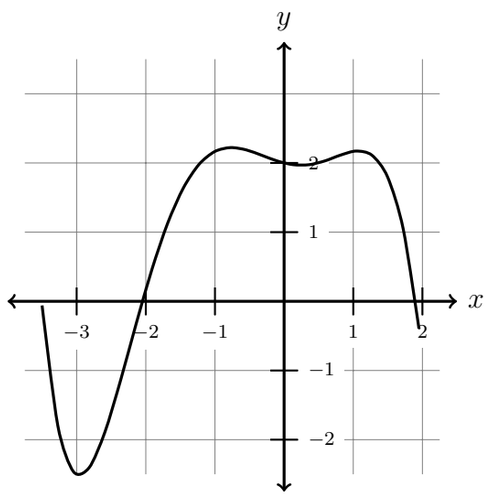
9. (5 points) Solve $(3x-4)^2 - 25 = 0$

10. (5 points) Solve the following inequality, and write the solution using interval notation.

$$6x^2 + 5x + 1 \leq 0$$

11. (5 points) Write the domain of $f(x) = \dfrac{\sqrt{x+4}}{x^3 + 3x^2 - 4x}$ using set-builder notation.

12. (10 points) Consider the graph of the polynomial $p(x)$.



Fill in the blank or circle the answer which makes the sentence true.

(a) The degree of p is (even / odd)

(b) The leading coefficient of p is (positive / negative)

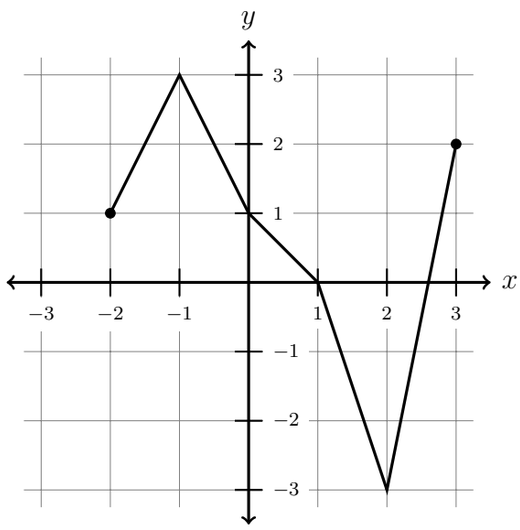
(c) The degree of p must be at least _____.

(d) The value of $p(0)$ is _____.

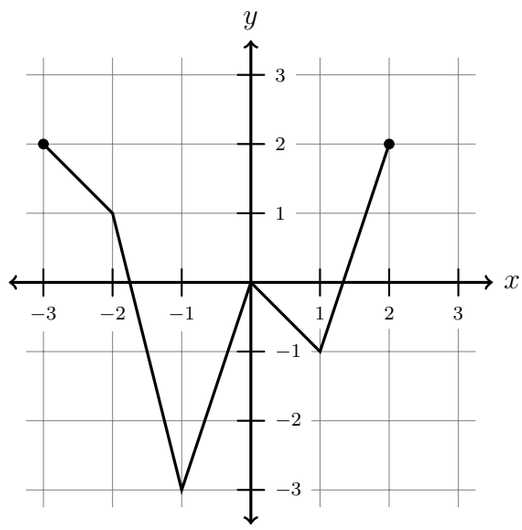
(e) The number of solutions of $p(x) = 3$ is _____.

13. (5 points) The perimeter of a rectangle is 300 feet and the length of the rectangle is 3 feet more than twice the width. Find the area of this rectangle.

14. Consider the functions, f and g whose graphs are given below.



$y = f(x)$



$y = g(x)$

(a) (10 points) Complete the following table of values. If a value is not in the domain, write **DNE**.

x	-3	-2	-1	0	1	2	3
$(g \circ f)(x)$							

(b) (5 points) In reference to the above graphs, evaluate $(f \circ g \circ g \circ g \circ f)(-2)$.