



# BISHOP’S UNIVERSITY

## MATH 190: FINAL EXAM FALL 2016

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.
- This test is 180 minutes in length.
- Do not remove any pages from this test.
- The back of each page may be used for scrap paper. No additional scrap paper allowed.
- A **Casio fx260-solar** calculator is permitted.

Page	Points	Score
2	15	
3	15	
4	20	
5	15	
6	15	
7	15	
8	15	
Total:	110	

1. (5 points) Write  $64025_9$  in base 10.
2. (5 points) Write 8197 in base 5.
3. (5 points) Multiply  $747_8$  and  $56_8$ , writing the answer in base 8. You may use the standard algorithms.

4. (5 points) Rationalize the denominator of  $\frac{7}{\sqrt{11}-5}$ .

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.

$$\frac{\left(\frac{(2xy^{-1}z^4)^3}{3x^2y}\right)}{\left(\frac{(3x^{-2}y^4z^2)^2}{5yz^5}\right)}$$

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

$$3x - 5 + \frac{1}{2x-1} - \frac{3}{\frac{1}{2}x + \frac{1}{3}}.$$

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

(a) (5 points)  $(2x - 1)^3$

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

8. Completely factor the following

(a) (5 points)  $q^2 + 3q - 28$

(b) (5 points)  $t^6 + 7t^3 - 8$

9. Solve

(a) (5 points)  $5w + 4 = 19 + 2w$

(b) (5 points)  $(x - 6)^2 - 16 = 0$

(c) (5 points)  $f(f + 2) = (f - 1)(2f + 3)$

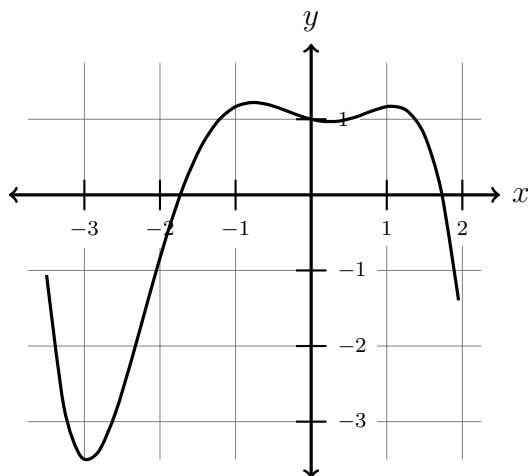
10. Solve, and write the solution using interval notation.

(a) (5 points)  $x^2 - 3x + 2 \leq 0$

(b) (5 points)  $x^3 > 16x$

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

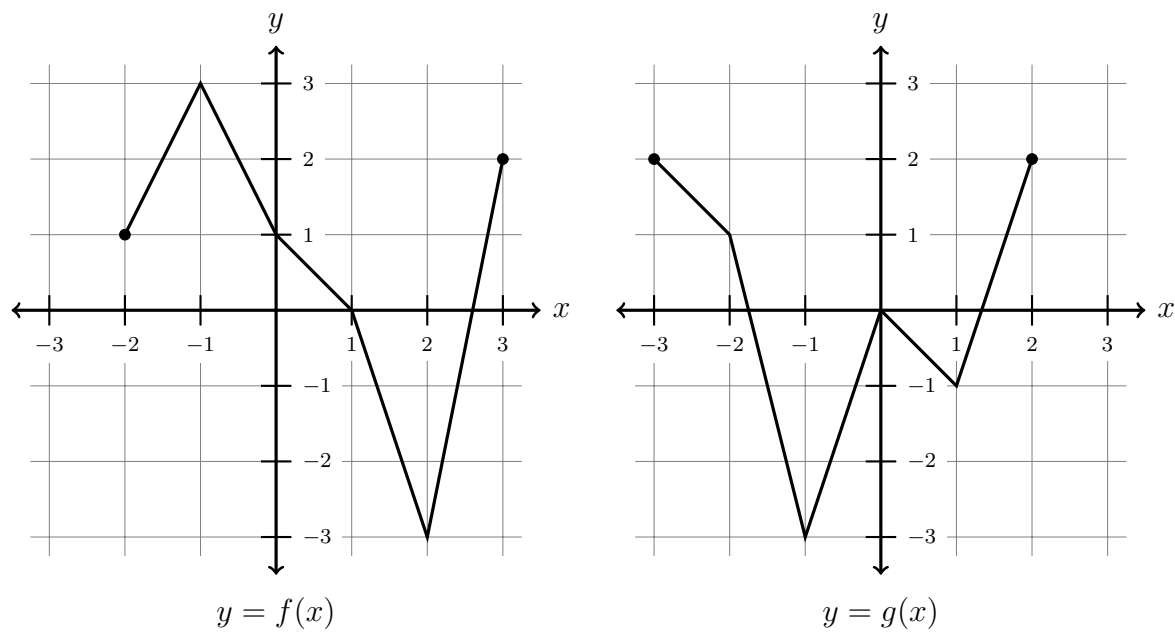
12. (10 points) Consider the graph of the polynomial  $p(x)$ .



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  $p(x) = -2$  is \_\_\_\_\_.
13. (5 points) A rectangular house is located on a rectangular piece of land. The length of the house is 30 feet more than half of its width. The length of the plot of land is 32 feet shorter than the perimeter of the house, and the land is 2 feet wider than the width of the house doubled. If the perimeter of the land is 300 feet, what is the area of the house?

14. (10 points) Consider the functions,  $f$  and  $g$  whose graphs are given below.



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

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

15. (5 points) Let  $f(x) = \frac{2}{x}$ ,  $g(x) = x^3$ , and  $h(x) = 3x^2 - 100$ . Evaluate  $(f \circ h \circ g)(-2)$ .