Bishop's University

Math 190: Final Exam
Winter 2018

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** or **Casio fx260-solar II** calculator is permitted.

Page	Points	Score
2	20	
3	20	
4	20	
5	20	
6	20	
7	15	
8	10	
Total:	125	

1. (6 points) Write 64025_7 in base 10.

2. (6 points) Write 9871 in base 6.

3. (8 points) Multiply 645_8 and 65_8, writing the answer in base 8. You may use the standard algorithms.

4. (5 points) Rationalize the denominator of $\dfrac{3+\sqrt{7}}{\sqrt{7}-2}$.

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.

$$\frac{(6x^4y^3z)^{-2}}{(2xy^2z)^{-4}}$$

6. (10 points) Write as a single fraction and simplify:

$$2+\frac{3x+26}{x^2-4}-\frac{2x-1}{x+2}.$$

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

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

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

8. Completely factor the following

   (a) (5 points) $3x^6+42x^5-216x^4$

   (b) (5 points) $64w^3+27$

9. Solve

(a) (5 points) $4w + 5 = 17 - 2w$

(b) (7 points) $(3x + 2)^2 - 25 = 0$

(c) (8 points) $z(z - 2) = (z - 1)(2z + 3)$

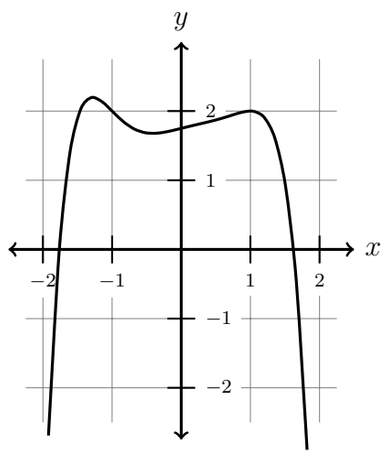
10. Solve, and write the solution using interval notation.

(a) (6 points) $x^2 - 3x + 2 \geq 0$

(b) (6 points) $x^3 < 16x^2$

11. (8 points) Write the domain of $f(x) = \dfrac{\sqrt{x-4}}{x^2 - 3x - 4}$ 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 $p(-1)$ is _____.

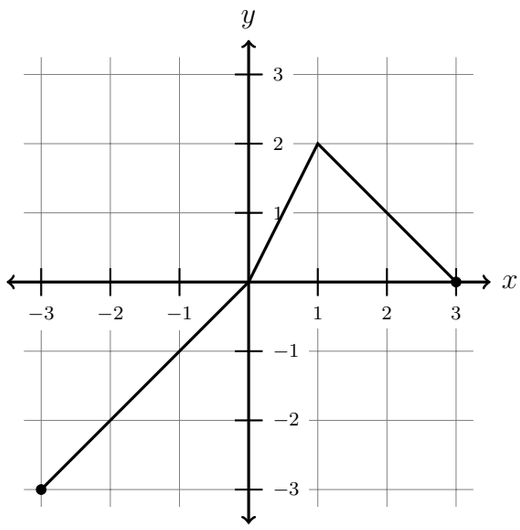
(e) The number of solutions of $p(x) = 2$ is _____.

13. **[You may use decimals in this question, with up to 3 decimal places.]** For books between 110 and 828 pages, the On-Demand publisher CreateSpace charges \$0.85 per book in addition to \$0.012 per page. They also get a commission of 40% of the retail price. Let the variables C represent the cost of one book, n the number of pages in one book, and R the retail price of one book.

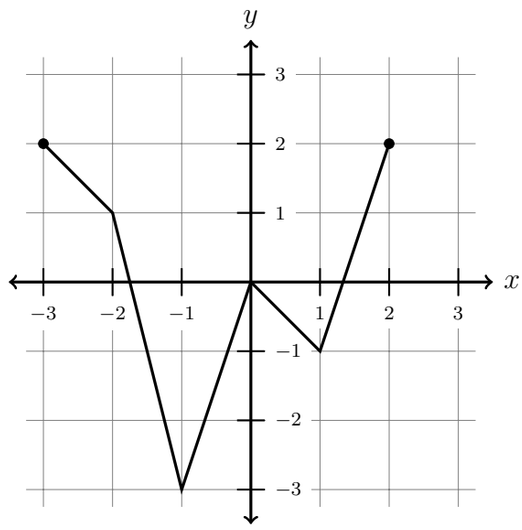
(a) (3 points) What retail price, R, should be charged to ensure the author gets 35% of the retail price? (Note, the answer will be a function of n.)

(b) (2 points) Photocopying costs at Bishop's University are \$0.065 per page. If a 350 page book is published using CreateSpace, and the retail price gives the author 35% profit, would it be cheaper for the student to photocopy the book or to buy it? (Assume no tax or shipping costs.)

14. (7 points) Consider the functions, f and g whose graphs are given below.



$y = f(x)$



$y = g(x)$

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

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

15. (3 points) Let $f(x) = \dfrac{6}{x}$, $g(x) = x^2$, and $h(x) = (x-5)(x+5)$. Evaluate $(g \circ h \circ f)(3)$.