

MAC 1140
Fall 2015
EXAM 3

Section # _____ Name _____

UF ID # _____ Signature _____

- A. Sign your scantron on the back at the bottom in ink.
- B. In pencil, write and encode on your scantron in the spaces indicated:
- 1) Name (last name, first initial, middle initial)
 - 2) UF ID Number
 - 3) Section Number
- C. Under “special codes”, code in the test ID number 3, 1.
- | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 2 | ● | 4 | 5 | 6 | 7 | 8 | 9 | 0 |
| ● | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 0 |
- D. At the top right of your answer sheet, for “Test Form Code”, encode A.
- B C D E
- E. 1) There are 5 (1-point) True/False questions, 6 (2-point), and 6 (3-point) multiple choice questions, plus 2 (20 points total) free response questions for a total of 55 points (this includes 5-points extra/bonus for this exam).
- 2) The time allowed is 90 minutes.
 - 3) You may write on the test.
 - 4) Raise your hand if you need more scratch paper or if you have a problem with your test. **DO NOT LEAVE YOUR SEAT UNLESS YOU ARE FINISHED WITH THE TEST.**
- F. **KEEP YOUR SCANTRON COVERED AT ALL TIMES.**
- G. When you are finished:
- 1) Before turning in your test, check for transcribing errors. Any mistakes you leave in are there to stay.
 - 2) Bring your test, scratch paper, and scantron to your proctor to turn them in. Be prepared to show your UF ID card.
 - 3) Answers will be posted in Canvas after the exam.

The Honor Pledge: ”On my honor, I have neither given nor received unauthorized aid in doing this exam.”

Student’s Signature: _____

Questions 1–5 are worth 1 point each.

1. The sum of the multiplicities of all factors of a polynomial must be equal to the degree of the polynomial.

A. True B. False

2. 7th degree polynomials have 6 turning points.

A. True B. False

3. The standard form of parabolas with vertex (h, k) is $y = (x - h)^2 + k$.

A. True B. False

4. A rational function can cross its horizontal asymptote.

A. True B. False

5. A polynomial of even degree must have a real zero.

A. True B. False

Questions 6–10 are worth 2 points each.

6. Let $f(x) = \frac{(x^2 + 4x + 4)(x + 2)}{(x^2 - 4)(x - 2)}$. Find any vertical asymptotes and holes (if there are any).
- A. VA: $x = 2$, Hole(s): $(-2, 0)$
B. VA: None, Hole(s): $(-2, 2)$
C. VA: $x = 2$ and $x = -2$, Hole(s): $(2, 0)$ and $(-2, 0)$
D. VA: $x = 2$ and $x = -2$, Hole(s): None
E. VA: None, Hole(s): None
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7. Suppose x and y are integers with $2x + y = 30$. Find the minimum value of $x^2 + y$.
- A. 0 B. 4 C. 15 D. 29 E. 49
-

8. Let $f(x) = x^6 - 73x^4 - 59x^3 + 104x^2 + x$. Evaluate $f(-8)$.
- A. -47 B. 1 C. 131 D. 0 E. -8
-

9. Compute $i^{113} + i^{77} - (1 + i) \cdot (3 - 2i)$ and simplify.
- A. $5 + i$ B. $-3 - 5i$ C. $5 + 2i$
D. $-3 + i$ E. $-5 + i$
-

10. Rationalize $\frac{1 + 2i}{3 - 4i}$ and simplify.
- A. $\frac{1}{25} + \frac{2}{25}i$ B. $\frac{5}{7} - \frac{10}{7}i$ C. $\frac{11}{25} + \frac{10}{25}i$
D. $-\frac{1}{5} + \frac{2}{5}i$ E. $\frac{11}{7} + \frac{10}{7}i$
-

Questions 11–15 are worth 3 points each.

11. Find the sum of the zeros for the polynomial $f(x) = 4x^3 + 8x^2 + x + 2$ given that one of the zeros is $\frac{i}{2}$

A. i

B. 0

C. $\frac{i}{2} - 2$

D. $i+2$

E. -2

12. Which of the following are true for a complex z :

P $\bar{z} + z$ is real.

Q $\bar{z}z$ is real.

R If $z + \bar{z}$ is a zero of a polynomial with real coefficients, then $z - \bar{z}$ is also a zero the same polynomial.

A. P Only

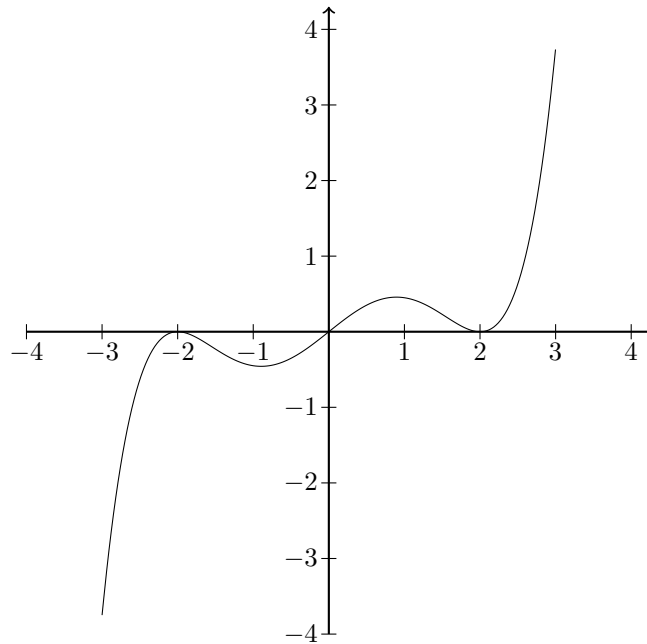
B. Q Only

C. P and Q Only

D. Q and R Only

E. P, Q, and R

13. Given the following graph decide which of the following are true.



P If this function is a polynomial, its degree may be 7.

Q The average rate of change of this function from $x = -2$ to $x = 2$ is 0.

R The function is increasing on the interval $(-\infty, 1)$

A. P Only

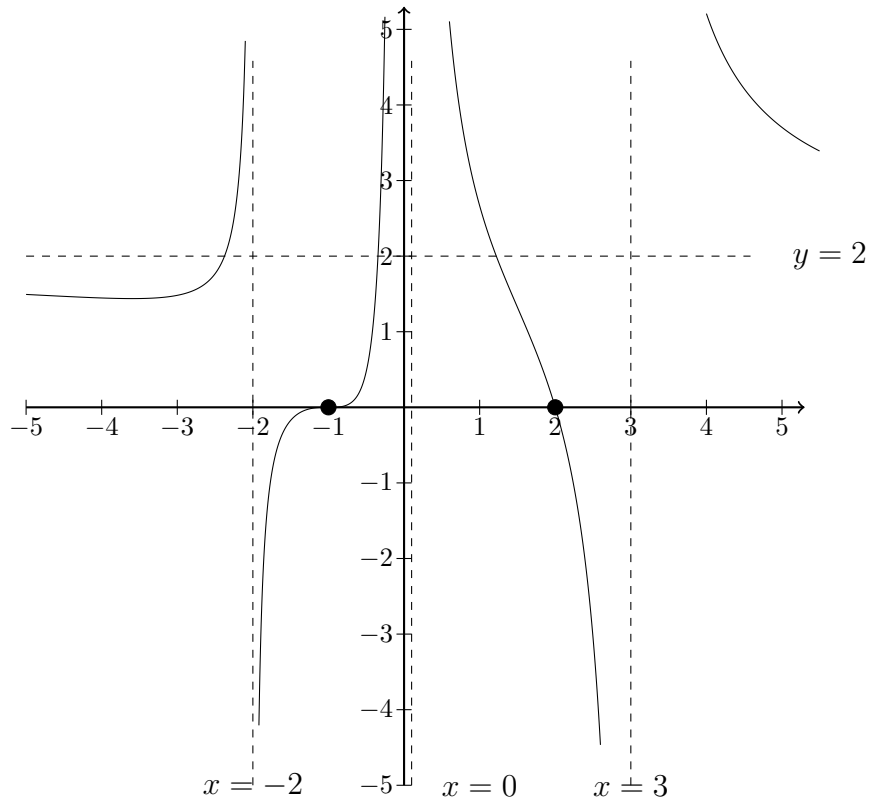
B. Q Only

C. P and Q Only

D. Q and R Only

E. P, Q, and R

14. Using the following graph, identify the rational function:



A. $\frac{2(x+1)(x-2)}{(x-3)(x+2)}$

B. $\frac{2(x+1)^2(x-2)}{x(x-3)(x+2)}$

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

D. $\frac{(x+1)(x-2)}{2(x-3)(x+2)}$

E. $\frac{2(x+1)^3(x-2)}{x^2(x-3)(x+2)}$

15. Let $f(x) = 2x^3 - 12x^2 + 22x - 12$. How many turning points does this function have?

A. 0

B. 1

C. 2

D. 3

E. 4

16. [BONUS: 3 Points, as it appears at the end of Lecture 12] The unit price p of a certain product and quantity sold x are related by the demand equation $p = -\frac{1}{2}x + 30$ for $0 \leq x \leq 60$. What quantity x will maximize revenue and what will the maximum revenue be?
- A. 30 units, \$900 B. 60 units, \$0 C. 15 units, \$22.50
D. 60 units, \$1800 E. 30 units, \$450
-

17. [BONUS: 2 Points] How much time did you spend studying for this exam? (Hint: there is no wrong answer, but please only choose one.)
- A. None, I...uh...kinda forgot about the exam.
B. 1-5 hours, There were only a few things I was unsure about.
C. 5-10 hours, I made sure to go over all the study materials.
D. 10-20 hours, I did every problem 3 times...just to be sure the answers didn't change.
E. 20- ∞ , I am always studying pre-calc, all day, every day.
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YOU MUST SHOW ALL WORK TO RECEIVE FULL CREDIT.

1. [10 points] Suppose $f(x) = 2x^5 - 5x^4 + x^3 + 6x^2 - 6x - 4$ and that $1 + i$ is a zero of the polynomial. Find all zeros with multiplicities. Write out complete factored form as in linear factorization theorem.

Zeros: _____

Complete factored form: _____

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2. [10 points] Let $g(x) = \frac{-x^2}{x^3 + 2x^2 + x}$. Find all intercepts, vertical asymptotes, holes, horizontal asymptotes, and if it crosses its asymptotes. Then graph the function on the axis below. Make sure to label all of the information mentioned above.

