College Algebra Math 1050
January, 2019
Final Exam Version 1 - *Rubric*

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1. $\begin{bmatrix} 8 & 1 \\ -3 & 20 \end{bmatrix}$ **(2 pts)** all or nothing

2. $\{x | x \le \frac{4}{3}\}$ *Answer can be written in any form* **(2 pts)** all or nothing

3. $10,000 = 5,000 \left(1 + \frac{0.055}{12}\right)^{12t}$ **OR** $2 = \left(1 + \frac{0.055}{12}\right)^{12t}$ **(3 pts)** all or nothing

4. $\log_a 4 = 3$ **(3 pts)** all or nothing

5. $\log_b x = \frac{9}{2}$ **(3 pts)** all or nothing

6. $x \ne \pm 2$ *Answer can be written in any form.* **(3 pts)** all or nothing

7. $\left(\frac{3}{2} \pm \frac{1}{2}\sqrt{37}, 0\right)$ **OR** $\left(\frac{3 \pm \sqrt{37}}{2}, 0\right)$ **(3 pts)** all or nothing

Answer must be written as an ordered pair

8. $\left(0, \frac{7}{4}\right)$ **OR** $(0, 1.75)$ **(3 pts)** all or nothing

Answer must be written as an ordered pair

9. $x = -1, x = -2$ **(3 pts)** all or nothing

Answer must be written as an equation

10. $y = 0$ **(3 pts)** all or nothing

Answer must be written as an equation

11. $\frac{16!}{13!3!}(3a)^3(-1)^{13}$ **OR** $\binom{16}{3}(3a)^3(-1)^{13}$

OR $\binom{16}{13}(3a)^3(-1)^{13}$ **(3 pts)** all or nothing

12. **(b)** $\left[\begin{array}{ccc|ccc} 3 & 2 & 1 & 1 & 0 & 0 \\ -2 & 7 & 0 & 0 & 1 & 0 \\ -4 & 5 & 7 & 0 & 0 & 1 \end{array}\right]$ **(3 pts)** all or nothing

13. $\{x | x \ne 0, x \ne 2\}$ *Answer must be in set builder notation* **(3 pts)** all or nothing

14. $f^{-1}(9) = -2$ **(3 pts)**   all or nothing

15. **(b)** $(f \circ g)(x) = x^6 + 2$.   **(3 pts)**   all or nothing

16. $(f \circ g)(2) = 7$.   **(3 pts)**   all or nothing

17. **(d)** Neither are proposing a valid first step.   **(3 pts)**   all or nothing

18. -2 **(3 pts)**   all or nothing

19. $b_3 = \mathbf{21}$ **(3 pts)**   all or nothing

20. 18.3 years *Unit need not be present*   **(3 pts)**   all or nothing

21. **(b)** $5 = 2^{4x}$ **(3 pts)**   all or nothing

22. $\dfrac{A}{x} + \dfrac{Bx + C}{x^2 + 4}$ **(4 pts)**   all or nothing

23. $x = -1, y = 7$ **(4 pts)**   2 pts for each correct variable

24. $3x + 5$ **(4 pts)**   all or nothing

25. **(a)** $\dfrac{1}{x + 4} - \dfrac{3}{x - 2} < 0$ **(4 pts)**   all or nothing

26. $(-1, 2) \cup (3, \infty)$ **(4 pts)**   all or nothing

27. **(c)** $(2x + 1)(x - 3) > 0$ **(4 pts)**   all or nothing

28. $(f - g)(3) = \mathbf{1}$ **(4 pts)**   all or nothing

29(a). $(1, \infty)$ **(2 pts)**   all or nothing
Answer may be written in any form

29(b). $(0, 2)$ **(2 pts)**   all or nothing
Answer must be written as an ordered pair

30. $S = \dfrac{12}{5}$

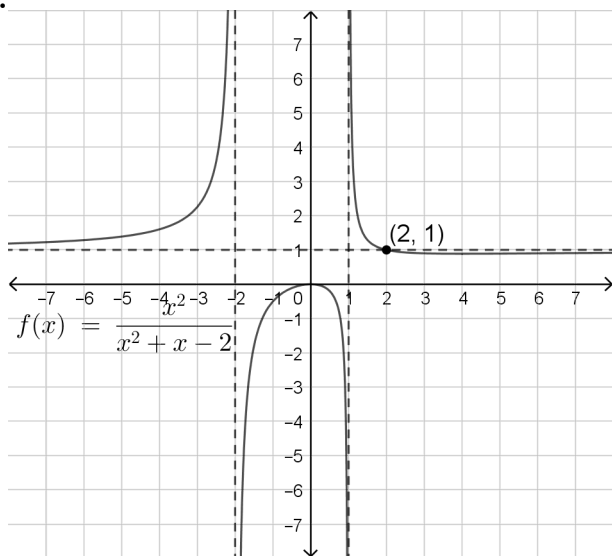**(7 pts)**   For correct answer with supporting work.

If the answer is NOT correct:

(4 pts)   For calculating r correctly: $r = -\frac{2}{3}$

(3 pts)   For using formula to find the sum correctly. Could be implied. Award these points if r is incorrect, but correctly used to find the sum:
$$S = \frac{a}{1 - r}, \quad a = 4$$

31.

$$f(x) = \frac{x}{x^2 + x - 2}$$

with point $(2, 1)$ marked on the graph.

(9 pts)   If the graph is sketched perfectly

If the graph is NOT sketched correctly:

(3 pts)   For **all** of the following:

- Graph is sketched over the entirety of the domain
- Correct number of vertical asymptotes are present on the graph
- Correct type of non-vertical asymptote is present on the graph
- Graph clearly demonstrates knowledge of asymptotic behavior

THEN

(2 pts)   For **all** of the following:

- Correct x and y intercepts are present on the graph
- No extraneous intercepts are present on the graph

32. $A^{-1} = \begin{bmatrix} 14 & -2 & 11 \\ -8 & 1 & -7 \\ 1 & 0 & 1 \end{bmatrix}$

(7 pts)   For correct answer with supporting work.

If the answer is NOT correct:

(4 pts)   For having reduced row eschelon form on the left side
of the matrix and any valid form on the right side of the matrix

for example: $\begin{bmatrix} 1 & 0 & 0 & | & \_ & \_ & \_ \\ 0 & 1 & 0 & | & \_ & \_ & \_ \\ 0 & 0 & 1 & | & \_ & \_ & \_ \end{bmatrix}$

specifically, right side has the appropriate number of entries

33. $x = 2$

(7 pts)   For correct answer with supporting work.

If the answer is NOT correct:

(4 pts)   for getting to the correct quadratic equation using valid logarithmic properties

34a. $\$40,000,000$

(3 pts)   For correct answer. All or nothing.

34b. In 42 years the initial investment will reach $640,000,000, which is over the allowable amount.

(4 pts)   Answer must include the idea that if the account keeps growing indefinitely
under the given conditions the balance will exceed the allowable
amount at some point in time.

35a. One answer should have $(-,-)$ coordinates and one answer have $(+,+)$ coordinates.

> **(2 pts)** For reasonable ordered pairs with the correct signs on the coordinates, one point for each coordinate, up to 2 pts
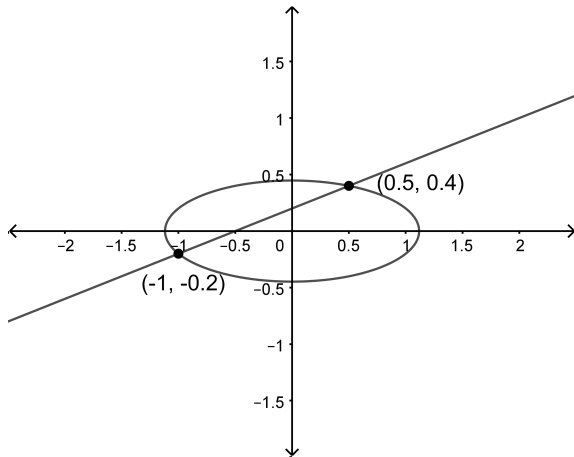
35b. $\left(-1, -\frac{1}{5}\right)$ and $\left(\frac{1}{2}, \frac{2}{5}\right)$

> **(5 pts)** For correct answer with supporting work.

If the answer is NOT correct:

> **(2 pts)** For valid algebraic substitution as first step.
> **THEN**
> **(2 pts)** For correct numeric answer for one variable

36. $(f \circ g)(x) = \dfrac{3x}{3x - 2}$

> **(5 pts)** For correct answer with supporting work.

If the answer is NOT correct:

> **(2 pts)** for correcting substituting $g(x)$ into $f(x)$

37. $(-2, 1) \cup [10, \infty)$

(8 pts)   For correct answer with supporting work.

If the answer is NOT correct:

(3 pts)   for choosing correct denominator to simplify equation
(2 pts)   for finding the correct expression compared to zero

OR

(3 pts)   for indicating the correct restriction(s) on the domain
(2 pts)   for finding the correct expression compared to zero