MID-TERM REVIEW  
(Take-Home Project #1)  

This take-home project is a review of some of the material you have learned in Math 0373. Complete the following problems, and turn them in with your work to your lab instructor. See you lab instructor for the due date. No makeups are allowed on this lab activity. Failure to return this lab activity will result in a 4 point reduction in your course average. To receive credit, show your work for all solutions to the questions. There are some answers to the questions at the bottom of this sheet. Good luck!

Factor completely
1. \( a^3 - 81a^2 - 4a + 324 \)
2. \( w^5 - 15w^4 + 54w^3 \)
3. \( 3t^2 - 10t + 8 \)
4. \( 1 - s^4p^4 \)

Multiply and simplify.
5. \( \frac{ac^2}{2c^2 - 12c + 18} \cdot \frac{2c - 6}{2c} \)
6. \( \frac{2c^2 - 8}{8c^2 - 200} \cdot \frac{32c + 160}{4c - 8} \)
7. \( \frac{a^3 + 27}{a^2 - 9} \cdot \frac{a^2 - 6a + 9}{a^2 - 3a + 9} \)

Divide and simplify.
8. \( \frac{5z - 15}{6} \div \frac{z - 3}{14} \)

Add. Simplify, if possible.
9. \( \frac{w + s}{ws^2} + \frac{6w + s}{w^2s} \)
10. \( \frac{3}{z - 2} + \frac{4}{(z - 2)^2} \)
11. \( \frac{25d}{3d - 15} + \frac{9d}{15d - 75} \)

Subtract. Simplify, if possible.
12. \( \frac{c}{y + c} - \frac{c}{y - c} \)
Simplify.

\[
\frac{5a - 6}{7a} \quad \frac{4y^3 - 7}{8y} \\
\frac{a - 5}{14a} \quad \frac{x}{y^4}
\]


Solve.

\[
\frac{1}{3} + \frac{5}{8} = \frac{q}{12} \\
\frac{5}{x - 1} + \frac{3}{x + 1} = \frac{-x}{x^2 - 1}
\]

15. 16.

17. A new photocopier works 3 times as fast as an old one. When the machines work together, a university can produce all its staff manuals in 12 hr. Find the time it would take each machine, working alone, to complete the job.

19. A paddleboat can move at a speed of 6 km/h in still water. The boat is paddled 22 km downstream in a river in the same time in takes to go 11 km upstream. What is the speed of the river?

20. 10 cm³ of a normal specimen of human blood contains 1.2 g of hemoglobin. How many grams does 23 cm³ of the same blood contain?

21. Solve \( \frac{1}{c} = \frac{1}{t} + \frac{1}{y} \) for \( y \)

22. Solve \( C = \frac{9G}{M + 9s} \) for \( M \)

23. Solve \( \frac{C}{j} = \frac{P + s}{s} \) for \( s \)

SOME ANSWERS:

3. \((3t - 4)(t - 2)\) 7. \(a - 3\)

9. \(\frac{w^2 + 7ws + s^2}{w^2s^2}\) 15. \(\frac{23}{2}\)

17. \(\frac{-2}{9}\)

19. 2 20. 2.76 23. \(\frac{jP}{C - j}\)