

Read: Sections 5.4A, 5.5

Exercises:

- Due Monday, 1 March 2004:
 - Section 5.1 (p. 351): 2, 4, 10, 15, 20, 25, 40, 44, 45, 46
 - Section 5.2A (p. 359): 4, 7, 18, 22, 26
 - Due **Thursday**¹, 4 March 2004:
 - Section 5.3 (p. 367) 4, 9, 12, 28, 32, 37, 44, 50, 52, 55, 73, 78, 80. Extra credit: 82
 - Due Monday, 8 March 2004:
 - Section 5.4 (p. 374): 3, 5, 6, 7, 9, 11, 12, 14, 16, 19, 24, 28, 30, 32, 34. Extra credit: 38–40
 - Section 5.4A (p. 381): 2, 4, 6, 10, 16, 20, 24, 30, 42, 44, 46, 50, 52, 56, 58, 60, 62, 64, 66, 70. Extra credit: 75–86
 - Due Wednesday, 10 March 2004:
 - Section 5.5 (p. 390): 2, 4, 7, 12, 17, 24, 46, 42, 44, 48, 70, 72
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1. Midterm Tuesday.
2. No quiz this Thursday.
3. **Super extra credit!** Section 3.7 (p. 311): Exercise 80. You may turn this in anytime before the last day of class this semester. You must do it completely, correctly, and neatly, finishing each step. Please don't try this unless you are finished with all your other work and have studied sufficiently for the midterm. However, if you are looking for an extra challenge, this problem gives you a feel for higher mathematics.
4. Next week is “Dead week”. Contrary to popular belief, dead week doesn't mean no homework and no quizzes; it just means I can't give you a huge project or exam that week. I will have a quiz Wednesday of Dead Week for your benefit; you deserve to have feedback on the last few sections of the book before facing it on the final. Look for a final review packet soon.

¹I am moving the due date to Thursday on account of the midterm.

Quiz results

It turns out that all the quiz questions were written correctly (although I could have put the hole on the graph in the last question somewhere other than $(2, 16)$). The lesson to be learned here is that it is hard to do calculations in your head no matter how good at math you think you are. I'm sorry if the problems with the quiz caused any anxiety.

Here are the correct solutions, for your information:

1. Let $f(x) = \frac{(x+1)^2(x-1)^4}{(x-1)^2(x+1)^3}$. List any holes and any asymptotes.

Both 1 and -1 are roots of both the numerator and denominator. The root -1 has multiplicity 2 in the numerator and multiplicity -3 in the denominator, so there is a vertical asymptote at $x = -1$. The root 1 has multiplicity 4 in the numerator and multiplicity 2 in the denominator, so there is hole at $x = 1$.

2. Which of the following describes the end behavior of $f(x) = \frac{2x^3+3x+1}{x^3+4x^2-5x+7}$?

As $|x|$ gets large, $f(x) \approx \frac{2x^3}{x^3} = 2$, so there is a horizontal asymptote at $y = 2$

3. Simplify:

$$\frac{\left(a^{\frac{3}{2}}b^{\frac{1}{5}}\right)^2 a}{a^2b^{\frac{2}{5}}}$$

The simplification follows along these lines:

$$\frac{\left(a^{\frac{3}{2}}b^{\frac{1}{5}}\right)^2 a}{a^2b^{\frac{2}{5}}} = \frac{a^3b^{\frac{2}{5}}a}{a^2b^{\frac{2}{5}}} = a^2,$$

so the correct answer is (d).

4. Which describes the solutions to $|x + 1| \leq 3$?

We can rewrite this inequality as $-3 \leq x + 1 \leq 3$, so we have $-4 \leq x \leq 2$, which is the interval $[-4, 2]$.

5. Solve the inequality $|x^2 - 2x + 1| < -1$.

The absolute value of any expression cannot be negative, so there is no solution.

6. Create a complete graph of $f(x) = \frac{(x-2)(x+2)^2}{(x-2)}$. Show all intercepts, asymptotes, and holes.

There is a hole at $x = 2$ as this is a root of both the numerator and denominator. As long as we remember there is a hole at $x = 2$, we can in fact cancel $x - 2$ from both the numerator and denominator to obtain $f(x) = (x + 2)^2, x \neq 2$. Thus, the graph of f is the graph of the basic function $g(x) = x^2$ shifted left 2 units, with a hole at $x = 2$.