IM2 Semester 1 Final Exam Review D
(Study Guide Questions 28-33 & 40-42)

Square Roots

To classify number sums (problems 28–30):

Start by simplifying the square root(s).

If there is a negative in the radical $(\sqrt{-?}\,)$, then you make the inside positive by writing "i" in front $(i\sqrt{?}\,)$.

If there is a negative in front of the radical, do not include an "i" - this just means that it's negative.

If the root is perfect, square root it. If not, you can leave it as it is.

Next, add or subtract the two values, if you can.

If they are both integers (…, -3, -2, -1, 0, 1, 2, 3, …) then combine them by adding or subtracting.

Same signs: add the values and keep the sign.

Different signs: subtract the values and keep the sign of the bigger value.

If they both have "i," add or subtract the coefficients.

If only one has "i," then you can't combine them.

If they have the same number inside the radical $(\sqrt{?}\,)$, add or subtract the front number.

For example: $3\sqrt{5} - \sqrt{5} = 3\sqrt{5} - 1\sqrt{5} = 2\sqrt{5}$

If they have different numbers inside the radical $(\sqrt{?}\,)$, then you can't combine them.

Determine if the sum is real or complex.

If there is not an "i," then the problem is real and you can continue.

If there is one or more "i," it's complex and you are done.

If it's real, then determine if it's rational or irrational.

If there is a radical that cannot be simplified $(2\sqrt{5})$, then it's irrational.

If the number is an integer (…, -3, -2, -1, 0, 1, 2, 3, …), it's rational.

1. Will the sum of $-\sqrt{49}$ and 8 be real, or complex? If it is real, is it rational or irrational?	2. Will the sum of $\sqrt{32}$ and -9 be real, or complex? If it is real, is it rational or irrational?	3. Will the sum of $\sqrt{-36}$ and 9 be real, or complex? If it is real, is it rational or irrational?
4. Will the sum of $\sqrt{-25}$ and $-\sqrt{-25}$ be real, or complex? If it is real, is it rational or irrational?	5. Will the sum of 17 and $\sqrt{-8}$ be real, or complex? If it is real, is it rational or irrational?	6. Will the sum of $\sqrt{-9}$ and $\sqrt{9}$ be real, or complex? If it is real, is it rational or irrational?
7. Will the sum of $\sqrt{15}$ and -2 be real, or complex? If it is real, is it rational or irrational?	8. Will the sum of $\sqrt{-144}$ and $\sqrt{-16}$ be real, or complex? If it is real, is it rational or irrational?	9. Will the sum of $-\sqrt{4}$ and $\sqrt{4}$ be real, or complex? If it is real, is it rational or irrational?

To simplify perfect square roots involving negatives (problems 31–33):

Start by pulling out "*i*," if there is a negative under the radical.

If there is a negative in the radical $(\sqrt{-?}\,)$, then you make the inside positive by writing "i" in front $(i\sqrt{?}\,)$.

If there is a negative in front of the radical, do not include an "i" - this just means that it's negative.

Next, square root the value.

What number multiplies by itself to get this value?

10. What is the simplified form of the expression $-\sqrt{9}$?	11. What is the simplified form of the expression $\sqrt{-36}$?	12. What is the simplified form of the expression $\sqrt{-196}$?

13. What is the simplified form of the expression $-\sqrt{-25}$?	14. What is the simplified form of the expression $-\sqrt{144}$?	15. What is the simplified form of the expression $-\sqrt{-169}$?
16. What is the simplified form of the expression $\sqrt{-49}$?	17. What is the simplified form of the expression $-\sqrt{64}$?	18. What is the simplified form of the expression $-\sqrt{-121}$?

To simplify imperfect square roots in order to solve for *x* (problems 40–42):

  Start by canceling the square (^{2}) by putting $\pm\sqrt{}$ on the other side of the equation.

  Next, factor the radicand (the number inside the root). Find the biggest perfect square factor.

  Write the square root of the perfect factor before the radical and leave the imperfect factor under the radical.

19. Solve for *x* and extract the square roots of any perfect squares: $128 = x^2$	20. Solve for *x* and extract the square roots of any perfect squares: $180 = x^2$	21. Solve for *x* and extract the square roots of any perfect squares: $700 = x^2$
22. Solve for *x* and extract the square roots of any perfect squares: $80 = x^2$	23. Solve for *x* and extract the square roots of any perfect squares: $108 = x^2$	24. Solve for *x* and extract the square roots of any perfect squares: $175 = x^2$
25. Solve for *x* and extract the square roots of any perfect squares: $45 = x^2$	26. Solve for *x* and extract the square roots of any perfect squares: $20 = x^2$	27. Solve for *x* and extract the square roots of any perfect squares: $24 = x^2$

Answers

1. Real and Rational	2. Real and Irrational	3. Complex
4. Real and Rational	5. Complex	6. Complex
7. Real and Irrational	8. Complex	9. Real and Rational
10. -3	11. $6i$	12. $14i$
13. $-5i$	14. -12	15. $-13i$
16. $7i$	17. -8	18. $-11i$
19. $\pm8\sqrt{2}$	20. $\pm6\sqrt{5}$	21. $\pm10\sqrt{7}$
22. $\pm4\sqrt{5}$	23. $\pm6\sqrt{3}$	24. $\pm5\sqrt{7}$
25. $\pm3\sqrt{5}$	26. $\pm2\sqrt{5}$	27. $\pm2\sqrt{6}$