Proof summary for theory sylow_theorems
    IMP_finite_groups_TCC1................proved - complete   [shostak](0.46 s)
    p_subgroup_sylow?_TCC1................proved - complete   [shostak](0.55 s)
    p_subgroup_sylow?_TCC2................proved - complete   [shostak](0.48 s)
    subgroup_is_factor_TCC1..............proved - complete   [shostak](0.51 s)
    subgroup_is_factor_TCC2..............proved - complete   [shostak](0.52 s)
    subgroup_is_factor_TCC3..............proved - complete   [shostak](0.50 s)
    subgroup_is_factor...................proved - complete   [shostak](1.26 s)
    First_Sylow_Theorem_TCC1.............proved - complete   [shostak](0.50 s)
    First_Sylow_Theorem_TCC2.............proved - incomplete [shostak](0.51 s)
    First_Sylow_Theorem_TCC3.............proved - incomplete [shostak](0.51 s)
    First_Sylow_Theorem_TCC4.............proved - incomplete [shostak](0.54 s)
    First_Sylow_Theorem..................proved - incomplete [shostak](9.42 s)
    p_group_is_subgroup_TCC1.............proved - complete   [shostak](0.48 s)
    p_group_is_subgroup_TCC2.............proved - incomplete [shostak](0.69 s)
    p_group_is_subgroup_TCC3.............proved - incomplete [shostak](0.51 s)
    p_group_is_subgroup..................proved - incomplete [shostak](1.08 s)
    p_subgroup_sylow_order_TCC1..........proved - incomplete [shostak](0.54 s)
    p_subgroup_sylow_order...............proved - incomplete [shostak](1.99 s)
    conjugate_is_p_subgroup_sylow_TCC1...proved - incomplete [shostak](0.57 s)
    conjugate_is_p_subgroup_sylow........proved - incomplete [shostak](0.88 s)
    unique_is_normal.....................proved - incomplete [shostak](0.98 s)
    Second_Sylow_Theorem_TCC1............proved - incomplete [shostak](0.46 s)
    Second_Sylow_Theorem_TCC2............proved - incomplete [shostak](0.58 s)
    Second_Sylow_Theorem.................proved - incomplete [shostak](1.60 s)
    Third_Sylow_Theorem_TCC1.............proved - incomplete [shostak](0.54 s)
    Third_Sylow_Theorem_TCC2.............proved - incomplete [shostak](0.57 s)
    Third_Sylow_Theorem..................proved - incomplete [shostak](0.21 s)
    Theory sylow_theorems totals: 27 formulas, 27 attempted, 27 succeeded (27.44
s)

Proof summary for theory isomorphism_theorems
    G_TCC1...............................proved - complete   [shostak](0.44 s)
    GP_TCC1..............................proved - complete   [shostak](0.45 s)
    quotient_subgroup_TCC1...............proved - complete   [shostak](0.49 s)
    quotient_subgroup_TCC2...............proved - complete   [shostak](0.51 s)
    quotient_subgroup_TCC3...............proved - complete   [shostak](0.49 s)
    quotient_subgroup_TCC4...............proved - complete   [shostak](0.49 s)
    quotient_subgroup....................proved - complete   [shostak](1.70 s)
    second_isomorphism_th_aux_TCC1.......proved - complete   [shostak](0.52 s)
    second_isomorphism_th_aux_TCC2.......proved - complete   [shostak](0.62 s)
    second_isomorphism_th_aux_TCC3.......proved - complete   [shostak](0.55 s)
    second_isomorphism_th_aux_TCC4.......proved - complete   [shostak](0.73 s)
    second_isomorphism_th_aux............proved - complete   [shostak](2.24 s)
    second_isomorphism_th_TCC1...........proved - complete   [shostak](0.50 s)
    second_isomorphism_th_TCC2...........proved - complete   [shostak](0.47 s)
    second_isomorphism_th_TCC3...........proved - complete   [shostak](0.53 s)
    second_isomorphism_th_TCC4...........proved - complete   [shostak](0.51 s)
    second_isomorphism_th_TCC5...........proved - complete   [shostak](0.73 s)
    second_isomorphism_th................proved - complete   [shostak](3.51 s)
    third_isomorphism_th_aux_TCC1........proved - complete   [shostak](0.48 s)
    third_isomorphism_th_aux_TCC2........proved - complete   [shostak](0.49 s)
    third_isomorphism_th_aux_TCC3........proved - complete   [shostak](0.49 s)
    third_isomorphism_th_aux.............proved - complete   [shostak](1.95 s)

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    third_isomorphism_th_TCC1.............proved - complete    [shostak](0.53 s)
    third_isomorphism_th_TCC2.............proved - complete    [shostak](0.50 s)
    third_isomorphism_th_TCC3.............proved - complete    [shostak](1.04 s)
    third_isomorphism_th_TCC4.............proved - complete    [shostak](0.51 s)
    third_isomorphism_th_TCC5.............proved - complete    [shostak](0.88 s)
    third_isomorphism_th_TCC6.............proved - complete    [shostak](0.50 s)
    third_isomorphism_th.................proved - complete    [shostak](1.65 s)
    correspondence_theorem...............proved - complete    [shostak](1.77 s)
    Theory isomorphism_theorems totals: 30 formulas, 30 attempted, 30 succeeded
(26.28 s)

Proof summary for theory homomorphism_lemmas
    G_TCC1...............................proved - complete    [shostak](0.45 s)
    GP_TCC1..............................proved - complete    [shostak](0.00 s)
    natural_homo_TCC1....................proved - complete    [shostak](0.50 s)
    natural_homo_TCC2....................proved - complete    [shostak](0.50 s)
    natural_homo.........................proved - complete    [shostak](1.19 s)
    homo_inv_TCC1........................proved - complete    [shostak](0.49 s)
    homo_inv.............................proved - complete    [shostak](0.71 s)
    kernel_normal........................proved - complete    [shostak](1.00 s)
    homo_image...........................proved - complete    [shostak](0.78 s)
    homo_image_normal_TCC1...............proved - complete    [shostak](0.53 s)
    homo_image_normal....................proved - complete    [shostak](1.04 s)
    homo_inv_image.......................proved - complete    [shostak](0.75 s)
    homo_inv_image_normal_TCC1...........proved - complete    [shostak](0.51 s)
    homo_inv_image_normal................proved - complete    [shostak](0.88 s)
    kernel_in_inv_image..................proved - complete    [shostak](0.69 s)
    homo_inv_image_image.................proved - complete    [shostak](1.18 s)
    homo_inv_image_image_cor.............proved - complete    [shostak](0.99 s)
    first_isomorphism_th_TCC1............proved - complete    [shostak](0.51 s)
    first_isomorphism_th_TCC2............proved - complete    [shostak](0.58 s)
    first_isomorphism_th_TCC3............proved - complete    [shostak](0.47 s)
    first_isomorphism_th_TCC4............proved - complete    [shostak](0.51 s)
    first_isomorphism_th.................proved - complete    [shostak](3.42 s)
    Theory homomorphism_lemmas totals: 22 formulas, 22 attempted, 22 succeeded
(17.70 s)

Proof summary for theory products_subgroups
    IMP_normal_subgroups_TCC1............proved - complete    [shostak](0.44 s)
    HK_subgroup..........................proved - complete    [shostak](0.76 s)
    HK_subgroup_permute..................proved - complete    [shostak](0.77 s)
    H_K_are_subgroups....................proved - complete    [shostak](0.54 s)
    Theory products_subgroups totals: 4 formulas, 4 attempted, 4 succeeded (2.52
s)

Proof summary for theory homomorphisms
    IMP_group_TCC1.......................proved - complete    [shostak](0.45 s)
    IMP_group_TCC2.......................proved - complete    [shostak](0.47 s)
    homomorphism?_TCC1...................proved - complete    [shostak](0.57 s)
    homo_one_TCC1........................proved - complete    [shostak](0.47 s)
    homo_one.............................proved - complete    [shostak](0.54 s)
    kernel_TCC1..........................proved - complete    [shostak](0.68 s)
    Theory homomorphisms totals: 6 formulas, 6 attempted, 6 succeeded (3.18 s)

Proof summary for theory p_groups
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      IMP_finite_groups_TCC1.................proved - complete   [shostak](0.49 s)
      alt_is_action_TCC1....................proved - complete   [shostak](0.60 s)
      alt_is_action.........................proved - complete   [shostak](0.53 s)
      Fix_iff_subset........................proved - complete   [shostak](0.65 s)
      Fix_iff_subset_cor_TCC1...............proved - complete   [shostak](0.56 s)
      Fix_iff_subset_cor....................proved - incomplete [shostak](0.73 s)
      subgroup_is_p_group_TCC1..............proved - complete   [shostak](0.49 s)
      subgroup_is_p_group...................proved - complete   [shostak](0.54 s)
      p_group_iff_power.....................proved - incomplete [shostak](0.62 s)
      p_divides_index.......................proved - incomplete [shostak](0.67 s)
      factor_cyclic_TCC1....................proved - complete   [shostak](0.61 s)
      factor_cyclic_TCC2....................proved - complete   [shostak](0.50 s)
      factor_cyclic_TCC3....................proved - complete   [shostak](0.63 s)
      factor_cyclic.........................proved - complete   [shostak](1.07 s)
      normalizer_index_TCC1.................proved - complete   [shostak](0.48 s)
      normalizer_index_TCC2.................proved - complete   [shostak](0.55 s)
      normalizer_index_TCC3.................proved - complete   [shostak](0.50 s)
      normalizer_index......................proved - incomplete [shostak](1.08 s)
      subgroup_proper.......................proved - incomplete [shostak](0.93 s)
      burside_theorem_TCC1..................proved - complete   [shostak](0.49 s)
      burside_theorem.......................proved - incomplete [shostak](1.45 s)
      p_square_is_abelian...................proved - incomplete [shostak](2.62 s)
      Theory p_groups totals: 22 formulas, 22 attempted, 22 succeeded (16.79 s)


Proof summary for theory normalizer_centralizer
      IMP_group_action_TCC1.................proved - complete   [shostak](0.47 s)
      normalizer_TCC1.......................proved - complete   [shostak](0.62 s)
      centralizer_TCC1......................proved - complete   [shostak](0.55 s)
      a_by_c_TCC1...........................proved - complete   [shostak](0.50 s)
      CL_TCC1...............................proved - complete   [shostak](0.55 s)
      normalizer_is_subgroup................proved - complete   [shostak](0.65 s)
      subset_of_normalizer..................proved - complete   [shostak](0.54 s)
      normal_in_normalizer_TCC1.............proved - complete   [shostak](0.49 s)
      normal_in_normalizer..................proved - complete   [shostak](0.53 s)
      centralizer_is_subgroup...............proved - complete   [shostak](0.69 s)
      singleton_iff_center..................proved - complete   [shostak](0.75 s)
      a_by_c_is_action......................proved - complete   [shostak](0.51 s)
      Fix_is_center_TCC1....................proved - complete   [shostak](0.50 s)
      Fix_is_center.........................proved - complete   [shostak](0.57 s)
      stabilizer_is_centralizer.............proved - complete   [shostak](0.55 s)
      orbit_is_CL...........................proved - complete   [shostak](0.51 s)
      orbits_is_CLs.........................proved - complete   [shostak](0.51 s)
      orbits_nFix_is_CLs_nc.................proved - complete   [shostak](0.58 s)
      CLs_eq_index_TCC1.....................proved - complete   [shostak](0.47 s)
      CLs_eq_index_TCC2.....................proved - complete   [shostak](0.53 s)
      CLs_eq_index..........................proved - incomplete [shostak](0.54 s)
      class_equation_2_TCC1.................proved - complete   [shostak](0.50 s)
      class_equation_2_TCC2.................proved - incomplete [shostak](0.67 s)
      class_equation_2......................proved - incomplete [shostak](0.61 s)
      Theory normalizer_centralizer totals: 24 formulas, 24 attempted, 24 succeeded
(13.40 s)


Proof summary for theory cauchy
      IMP_finite_cyclic_groups_TCC1.........proved - complete   [shostak](0.45 s)
      fseq_product_TCC1.....................proved - complete   [shostak](0.50 s)
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        fseq_product_TCC2.....................proved - incomplete [shostak](0.57 s)
        S_TCC1...............................proved - complete   [shostak](0.46 s)
        fseq_product_in......................proved - incomplete [shostak](1.00 s)
        fseq_product_o.......................proved - incomplete [shostak](1.34 s)
        fseq_product_one.....................proved - incomplete [shostak](1.01 s)
        fseq_product_power...................proved - incomplete [shostak](1.38 s)
        one_in_SE............................proved - incomplete [shostak](0.52 s)
        order_SE.............................proved - incomplete [shostak](0.62 s)
        S_bij_set_seq_TCC1...................proved - complete   [shostak](0.46 s)
        S_bij_set_seq........................proved - incomplete [shostak](1.70 s)
        S_is_finite..........................proved - incomplete [shostak](1.34 s)
        S_card_TCC1..........................proved - incomplete [shostak](0.47 s)
        S_card...............................proved - incomplete [shostak](0.60 s)
        F_TCC1...............................proved - incomplete [shostak](0.81 s)
        F_1_TCC1.............................proved - complete   [shostak](0.47 s)
        F_1_TCC2.............................proved - complete   [shostak](0.45 s)
        F_2_TCC1.............................proved - complete   [shostak](0.46 s)
        F_o_F12_TCC1.........................proved - incomplete [shostak](0.64 s)
        F_o_F12..............................proved - incomplete [shostak](1.28 s)
        fs_o_F21.............................proved - incomplete [shostak](0.77 s)
        F_in_S...............................proved - incomplete [shostak](1.59 s)
        F_is_action_TCC1.....................proved - incomplete [shostak](0.48 s)
        F_is_action_TCC2.....................proved - complete   [shostak](0.46 s)
        F_is_action_TCC3.....................proved - complete   [shostak](0.46 s)
        F_is_action_TCC4.....................proved - complete   [shostak](0.52 s)
        F_is_action..........................proved - incomplete [shostak](1.10 s)
        Fixed_subset_TCC1....................proved - incomplete [shostak](0.54 s)
        Fixed_subset_TCC2....................proved - incomplete [shostak](0.50 s)
        Fixed_subset.........................proved - incomplete [shostak](1.54 s)
        cauchy...............................proved - incomplete [shostak](1.82 s)
        cauchy_cor_TCC1......................proved - complete   [shostak](0.46 s)
        cauchy_cor...........................proved - incomplete [shostak](0.50 s)
        Theory cauchy totals: 34 formulas, 34 attempted, 34 succeeded (27.26 s)

    Proof summary for theory finite_cyclic_groups
        IMP_finite_groups_TCC1...............proved - complete   [shostak](0.46 s)
        prime_order_cycle....................proved - complete   [shostak](0.66 s)
        Theory finite_cyclic_groups totals: 2 formulas, 2 attempted, 2 succeeded (1.12
s)

    Proof summary for theory group_action
        IMP_lagrange_index_TCC1..............proved - complete   [shostak](0.47 s)
        group_action?_TCC1...................proved - complete   [shostak](0.52 s)
        group_action?_TCC2...................proved - complete   [shostak](0.51 s)
        stabilizer_TCC1......................proved - complete   [shostak](0.56 s)
        orbit_TCC1...........................proved - complete   [shostak](0.56 s)
        Fix_TCC1.............................proved - complete   [shostak](0.56 s)
        stabilizer_is_subgroup...............proved - complete   [shostak](0.59 s)
        singleton_iff_Fix....................proved - complete   [shostak](0.65 s)
        empty_iff_eq_Fix.....................proved - complete   [shostak](0.55 s)
        orbits_nFix_disj_Fix.................proved - complete   [shostak](0.69 s)
        orbits_is_union......................proved - complete   [shostak](0.65 s)
        orbit_nonempty.......................proved - complete   [shostak](0.47 s)
        orbits_nonempty......................proved - complete   [shostak](0.46 s)
        set_orbits_is........................proved - complete   [shostak](0.52 s)
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        orbit_is_finite.......................proved - complete   [shostak](0.49 s)
        orbits_disjoint.......................proved - complete   [shostak](0.73 s)
        orbits_partition......................proved - complete   [shostak](0.53 s)
        orbits_nFix_partition.................proved - complete   [shostak](0.56 s)
        orbits_eq_index_aux_TCC1..............proved - complete   [shostak](0.48 s)
        orbits_eq_index_aux...................proved - complete   [shostak](1.09 s)
        orbits_eq_index_TCC1..................proved - complete   [shostak](0.47 s)
        orbits_eq_index_TCC2..................proved - complete   [shostak](0.47 s)
        orbits_eq_index.......................proved - incomplete [shostak](0.57 s)
        counting_formula_TCC1.................proved - incomplete [shostak](0.53 s)
        counting_formula......................proved - incomplete [shostak](0.54 s)
        class_equation_TCC1...................proved - complete   [shostak](0.49 s)
        class_equation_TCC2...................proved - incomplete [shostak](0.59 s)
        class_equation........................proved - incomplete [shostak](1.17 s)
        Fix_congruence_TCC1...................proved - complete   [shostak](0.47 s)
        Fix_congruence........................proved - incomplete [shostak](1.25 s)
    Theory group_action totals: 30 formulas, 30 attempted, 30 succeeded (18.17 s)

  Proof summary for theory lagrange_index
        IMP_right_left_cosets_TCC1............proved - complete   [shostak](0.45 s)
        Lagrange_index........................proved - incomplete [shostak](0.71 s)
        index_divides.........................proved - incomplete [shostak](0.48 s)
        order_factor_TCC1.....................proved - complete   [shostak](0.50 s)
        order_factor..........................proved - incomplete [shostak](0.60 s)
    Theory lagrange_index totals: 5 formulas, 5 attempted, 5 succeeded (2.74 s)

  Proof summary for theory class_equation_scaf
        card_rest_aux_TCC1....................proved - complete   [shostak]( 0.49 s)
        card_rest_aux_TCC2....................proved - complete   [shostak]( 0.49 s)
        card_rest_aux_TCC3....................proved - complete   [shostak]( 0.51 s)
        card_rest_aux.........................proved - complete   [shostak]( 0.74 s)
        card_partition_TCC1...................proved - complete   [shostak]( 0.47 s)
        card_partition_TCC2...................proved - incomplete [shostak]( 1.24 s)
        card_partition........................proved - incomplete [shostak](14.01 s)
        divide_sigma_TCC1.....................proved - incomplete [shostak]( 0.48 s)
        divide_sigma_TCC2.....................proved - incomplete [shostak](15.21 s)
        divide_sigma..........................proved - incomplete [shostak](10.72 s)
    Theory class_equation_scaf totals: 10 formulas, 10 attempted, 10 succeeded
  (44.36 s)

  Proof summary for theory groups_scaf
        IMP_finite_groups_TCC1................proved - complete   [shostak](0.49 s)
        divby_r...............................proved - complete   [shostak](0.77 s)
        subgroup_transitive...................proved - complete   [shostak](0.48 s)
        normal_subgroup_tran..................proved - complete   [shostak](0.49 s)
        subgroup_intersection.................proved - complete   [shostak](0.60 s)
        conjugate_is_subgroup.................proved - complete   [shostak](0.74 s)
        center_is_normal_TCC1.................proved - complete   [shostak](0.48 s)
        center_is_normal......................proved - complete   [shostak](0.59 s)
        abelian_eq_center.....................proved - complete   [shostak](0.52 s)
        order_gt_1............................proved - incomplete [shostak](0.52 s)
        order_gt_p............................proved - incomplete [shostak](0.54 s)
        exists_diff_one.......................proved - complete   [shostak](0.49 s)
        one_iff_divides.......................proved - complete   [shostak](0.73 s)
        order_power_TCC1......................proved - complete   [shostak](0.46 s)
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    order_power_TCC2......................proved - complete   [shostak](0.48 s)
    order_power...........................proved - incomplete [shostak](1.54 s)
    coset_power_nat_TCC1..................proved - complete   [shostak](0.47 s)
    coset_power_nat_TCC2..................proved - complete   [shostak](0.47 s)
    coset_power_nat_TCC3..................proved - complete   [shostak](0.46 s)
    coset_power_nat_TCC4..................proved - complete   [shostak](0.51 s)
    coset_power_nat.......................proved - complete   [shostak](0.67 s)
    coset_power_int.......................proved - complete   [shostak](0.82 s)
    factor_of_cyclic_is_cyclic_TCC1.......proved - complete   [shostak](0.55 s)
    factor_of_cyclic_is_cyclic_TCC2.......proved - complete   [shostak](0.46 s)
    factor_of_cyclic_is_cyclic_TCC3.......proved - complete   [shostak](0.61 s)
    factor_of_cyclic_is_cyclic............proved - complete   [shostak](1.03 s)
    Theory groups_scaf totals: 26 formulas, 26 attempted, 26 succeeded (15.99 s)

Proof summary for theory finite_groups
    IMP_group_TCC1........................proved - complete   [shostak](0.36 s)
    finite_generated_by...................proved - complete   [shostak](0.41 s)
    finite_generated_by_def_TCC1..........proved - complete   [shostak](0.36 s)
    finite_generated_by_def...............proved - complete   [shostak](1.49 s)
    finite_generated_by_one...............proved - complete   [shostak](1.01 s)
    generated_by_card_1_TCC1..............proved - complete   [shostak](0.36 s)
    generated_by_card_1...................proved - complete   [shostak](0.41 s)
    finite_group_elements.................proved - complete   [shostak](0.43 s)
    period_TCC1...........................proved - complete   [shostak](0.42 s)
    a_hat_period_TCC1.....................proved - complete   [shostak](0.38 s)
    a_hat_period..........................proved - complete   [shostak](0.43 s)
    finite_subgroup_def...................proved - complete   [shostak](0.59 s)
    orders_equal..........................proved - complete   [shostak](0.40 s)
    period_is_generated_order_TCC1........proved - complete   [shostak](0.40 s)
    period_is_generated_order.............proved - complete   [shostak](1.48 s)
    period_element_divides_group..........proved - complete   [shostak](0.42 s)
    Theory finite_groups totals: 16 formulas, 16 attempted, 16 succeeded (9.34 s)

Proof summary for theory general_properties
    seq_power_TCC1........................proved - incomplete [shostak](0.48 s)
    only_power_p_TCC1.....................proved - incomplete [shostak](0.47 s)
    divides_element.......................proved - complete   [shostak](0.54 s)
    divides_rel_primes_TCC1...............proved - complete   [shostak](0.46 s)
    divides_rel_primes....................proved - incomplete [shostak](0.83 s)
    divides_product.......................proved - incomplete [shostak](0.78 s)
    product_power_TCC1....................proved - complete   [shostak](0.46 s)
    product_power.........................proved - incomplete [shostak](1.43 s)
    product_only_power_TCC1...............proved - incomplete [shostak](0.47 s)
    product_only_power....................proved - incomplete [shostak](2.71 s)
    divides_power.........................proved - complete   [shostak](0.83 s)
    divides_prime_power_TCC1..............proved - complete   [shostak](0.48 s)
    divides_prime_power_TCC2..............proved - complete   [shostak](0.46 s)
    divides_prime_power...................proved - incomplete [shostak](0.00 s)
    gcd_1_TCC1............................proved - complete   [shostak](0.45 s)
    gcd_1.................................proved - incomplete [shostak](0.63 s)
    gcd_1_nd_TCC1.........................proved - complete   [shostak](0.51 s)
    gcd_1_nd..............................proved - incomplete [shostak](0.59 s)
    gcd_1_ndp.............................proved - incomplete [shostak](0.76 s)
    gcd_1_gcd_1_TCC1......................proved - incomplete [shostak](0.51 s)
    gcd_1_gcd_1_TCC2......................proved - incomplete [shostak](0.51 s)
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        gcd_1_gcd_1...........................proved - incomplete [shostak](0.54 s)
    Theory general_properties totals: 22 formulas, 22 attempted, 22 succeeded
(14.88 s)


Proof summary for theory right_left_cosets
    IMP_lagrange_TCC1.....................proved - complete   [shostak](0.48 s)
    nonempty_left_coset_TCC1..............proved - complete   [shostak](0.54 s)
    nonempty_left_coset...................proved - complete   [shostak](0.50 s)
    left_coset_finite_TCC1................proved - complete   [shostak](0.51 s)
    left_coset_finite.....................proved - complete   [shostak](0.52 s)
    left_coset_correspondence.............proved - complete   [shostak](0.55 s)
    left_coset_correspondence_inv.........proved - complete   [shostak](0.59 s)
    finite_left_coset_correspondence_TCC1...proved - complete   [shostak](0.50 s)
    finite_left_coset_correspondence_TCC2...proved - complete   [shostak](0.52 s)
    finite_left_coset_correspondence_TCC3...proved - complete   [shostak](0.49 s)
    finite_left_coset_correspondence......proved - incomplete [shostak](0.69 s)
    set_left_cosets_full..................proved - complete   [shostak](0.54 s)
    left_cosets_disjoint..................proved - complete   [shostak](0.69 s)
    left_cosets_partition.................proved - complete   [shostak](0.58 s)
    set_right_cosets_full_1...............proved - complete   [shostak](0.59 s)
    right_left_correspondence.............proved - complete   [shostak](1.27 s)
    finite_right_left_correspondence_TCC1...proved - complete   [shostak](0.54 s)
    finite_right_left_correspondence_TCC2...proved - complete   [shostak](0.54 s)
    finite_right_left_correspondence......proved - incomplete [shostak](0.62 s)
    index_TCC1............................proved - complete   [shostak](0.56 s)
    index_gt1.............................proved - complete   [shostak](0.56 s)
    divide_TCC1...........................proved - complete   [shostak](0.54 s)
    divide_TCC2...........................proved - complete   [shostak](0.51 s)
    divide_TCC3...........................proved - complete   [shostak](1.17 s)
    card_factor_TCC1......................proved - complete   [shostak](0.80 s)
    card_factor_TCC2......................proved - complete   [shostak](0.44 s)
    card_factor...........................proved - complete   [shostak](1.56 s)
    Theory right_left_cosets totals: 27 formulas, 27 attempted, 27 succeeded
(17.41 s)


Proof summary for theory lagrange
    IMP_group_TCC1........................proved - complete   [shostak](0.36 s)
    right_coset_finite_TCC1...............proved - complete   [shostak](0.44 s)
    right_coset_finite....................proved - complete   [shostak](0.48 s)
    finite_right_coset_correspondence_TCC1...proved - complete   [shostak](0.37 s)
    finite_right_coset_correspondence_TCC2...proved - complete   [shostak](0.37 s)
    finite_right_coset_correspondence_TCC3...proved - complete   [shostak](0.37 s)
    finite_right_coset_correspondence.....proved - complete   [shostak](0.52 s)
    set_right_cosets_full.................proved - complete   [shostak](0.44 s)
    right_cosets_disjoint.................proved - complete   [shostak](0.53 s)
    right_cosets_partition................proved - complete   [shostak](0.47 s)
    Lagrange..............................proved - complete   [shostak](0.72 s)
    Theory lagrange totals: 11 formulas, 11 attempted, 11 succeeded (5.06 s)


Proof summary for theory lagrange_scaf
    partition_TCC1........................proved - complete   [shostak](0.35 s)
    finite_partition_TCC1.................proved - complete   [shostak](0.34 s)
    finite_partition_is_partition.........proved - complete   [shostak](0.38 s)
    card_Union_rest.......................proved - complete   [shostak](0.40 s)
    card_equal_partition_TCC1.............proved - complete   [shostak](0.33 s)
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        card_equal_partition_TCC2.............proved - complete    [shostak](0.34 s)
        card_equal_partition..................proved - complete    [shostak](1.23 s)
        card_eq_part_TCC1.....................proved - complete    [shostak](0.43 s)
        card_eq_part_TCC2.....................proved - complete    [shostak](0.42 s)
        card_eq_part_TCC3.....................proved - complete    [shostak](0.31 s)
        card_eq_part_TCC4.....................proved - complete    [shostak](0.43 s)
        card_eq_part..........................proved - complete    [shostak](0.37 s)
    Theory lagrange_scaf totals: 12 formulas, 12 attempted, 12 succeeded (5.32 s)

Proof summary for theory factor_groups
        IMP_normal_subgroups_TCC1.............proved - complete    [shostak](0.45 s)
        p0....................................proved - complete    [shostak](0.47 s)
        prep..................................proved - complete    [shostak](0.48 s)
        mult_prep.............................proved - complete    [shostak](0.48 s)
        mult_TCC1.............................proved - complete    [shostak](0.50 s)
        mult_lem_TCC1.........................proved - complete    [shostak](0.44 s)
        mult_lem_TCC2.........................proved - complete    [shostak](0.46 s)
        mult_lem..............................proved - complete    [shostak](0.70 s)
        mult_in...............................proved - complete    [shostak](0.50 s)
        mult_is_coset.........................proved - complete    [shostak](0.46 s)
        N_is_identity_TCC1....................proved - complete    [shostak](0.47 s)
        N_is_identity.........................proved - complete    [shostak](0.57 s)
        left_cosets_group_TCC1................proved - complete    [shostak](0.50 s)
        left_cosets_group_TCC2................proved - complete    [shostak](0.49 s)
        left_cosets_group.....................proved - complete    [shostak](0.72 s)
        over_TCC1.............................proved - complete    [shostak](0.51 s)
    Theory factor_groups totals: 16 formulas, 16 attempted, 16 succeeded (8.22 s)

Proof summary for theory normal_subgroups
        IMP_cosets_TCC1.......................proved - complete    [shostak](0.47 s)
        normal_prep...........................proved - complete    [shostak](0.67 s)
        normal_left_is_right..................proved - complete    [shostak](0.56 s)
        normal_subgroup_is_subgroup...........proved - complete    [shostak](0.47 s)
        nsg_prop..............................proved - complete    [shostak](0.49 s)
        nsg_prop2.............................proved - complete    [shostak](0.50 s)
        lc_gen_normal_TCC1....................proved - complete    [shostak](0.50 s)
        lc_gen_normal_TCC2....................proved - complete    [shostak](0.45 s)
        lc_gen_normal.........................proved - complete    [shostak](0.57 s)
        abelian_normal........................proved - complete    [shostak](0.53 s)
    Theory normal_subgroups totals: 10 formulas, 10 attempted, 10 succeeded (5.22
s)

Proof summary for theory cosets
        IMP_group_TCC1........................proved - complete    [shostak](0.36 s)
        congruence_is_equivalence.............proved - complete    [shostak](0.49 s)
        left_coset_subset.....................proved - complete    [shostak](0.41 s)
        right_coset_subset....................proved - complete    [shostak](0.40 s)
        left_coset_one........................proved - complete    [shostak](0.40 s)
        right_coset_one.......................proved - complete    [shostak](0.39 s)
        left_coset_assoc......................proved - complete    [shostak](0.41 s)
        right_coset_assoc.....................proved - complete    [shostak](0.43 s)
        lr_coset_assoc........................proved - complete    [shostak](0.53 s)
        subset_left_coset.....................proved - complete    [shostak](0.38 s)
        subset_right_coset....................proved - complete    [shostak](0.38 s)
        right_coset_TCC1......................proved - complete    [shostak](0.38 s)
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        right_coset_image_TCC1.................proved - complete    [shostak](0.40 s)
        right_coset_image......................proved - complete    [shostak](0.39 s)
        right_coset_is.........................proved - complete    [shostak](0.54 s)
        right_coset_def........................proved - complete    [shostak](0.37 s)
        nonempty_right_coset...................proved - complete    [shostak](0.39 s)
        right_coset_correspondence_TCC1........proved - complete    [shostak](0.39 s)
        right_coset_correspondence.............proved - complete    [shostak](0.65 s)
        left_coset_TCC1........................proved - complete    [shostak](0.37 s)
        left_coset_image.......................proved - complete    [shostak](0.39 s)
        left_coset_def.........................proved - complete    [shostak](0.36 s)
        lc_gen_TCC1............................proved - complete    [shostak](0.38 s)
        lc_gen_def_TCC1........................proved - complete    [shostak](1.04 s)
        lc_gen_def.............................proved - complete    [shostak](0.37 s)
        rc_gen_TCC1............................proved - complete    [shostak](0.38 s)
        rc_gen_def_TCC1........................proved - complete    [shostak](1.05 s)
        rc_gen_def.............................proved - complete    [shostak](0.38 s)
        lc_eq..................................proved - complete    [shostak](0.42 s)
        lc_is_eq...............................proved - complete    [shostak](0.45 s)
        rc_eq..................................proved - complete    [shostak](0.42 s)
        rc_is_eq...............................proved - complete    [shostak](0.46 s)
      Theory cosets totals: 32 formulas, 32 attempted, 32 succeeded (14.56 s)

  Proof summary for theory cyclic_group
        IMP_group_TCC1.........................proved - complete    [shostak](0.46 s)
        generated_by_lem.......................proved - complete    [shostak](0.47 s)
        generated_is_subgroup..................proved - complete    [shostak](0.47 s)
        generated_by_is_finite.................proved - complete    [shostak](0.58 s)
        cyclic_abelian.........................proved - complete    [shostak](0.53 s)
        cyclic_subgroup........................proved - complete    [shostak](1.12 s)
        is_cyclic..............................proved - complete    [shostak](0.50 s)
      Theory cyclic_group totals: 7 formulas, 7 attempted, 7 succeeded (4.14 s)

  Proof summary for theory zp_group
        Zn_group_TCC1..........................proved - complete    [shostak](0.45 s)
        Zn_group_TCC2..........................proved - complete    [shostak](0.45 s)
        Zn_group...............................proved - complete    [shostak](0.91 s)
        Zn_finite..............................proved - complete    [shostak](0.47 s)
        Zn_card_TCC1...........................proved - complete    [shostak](0.45 s)
        Zn_card................................proved - complete    [shostak](0.50 s)
      Theory zp_group totals: 6 formulas, 6 attempted, 6 succeeded (3.23 s)

  Proof summary for theory group
        IMP_monoid_TCC1........................proved - complete    [shostak](0.26 s)
        group_TCC1.............................proved - complete    [shostak](0.26 s)
        group_is_monoid........................proved - complete    [shostak](0.31 s)
        finite_group_TCC1......................proved - complete    [shostak](0.33 s)
        finite_group_is_group..................proved - complete    [shostak](0.31 s)
        finite_group_is_finite_monoid..........proved - complete    [shostak](0.32 s)
        finite_subgroups.......................proved - complete    [shostak](0.26 s)
        one_is_group...........................proved - complete    [shostak](0.28 s)
        one_finite_group.......................proved - complete    [shostak](0.26 s)
        one_group_TCC1.........................proved - complete    [shostak](0.34 s)
        group_card_gt_0........................proved - complete    [shostak](0.27 s)
        inv_exists.............................proved - complete    [shostak](0.27 s)
        inv_TCC1...............................proved - complete    [shostak](0.28 s)
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inv_left...............................proved - complete    [shostak](0.25 s)
inv_right..............................proved - complete    [shostak](0.26 s)
cancel_right...........................proved - complete    [shostak](0.30 s)
cancel_left............................proved - complete    [shostak](0.28 s)
inv_inv................................proved - complete    [shostak](0.27 s)
cancel_right_inv.......................proved - complete    [shostak](0.28 s)
cancel_left_inv........................proved - complete    [shostak](0.32 s)
inv_one................................proved - complete    [shostak](0.27 s)
inv_star...............................proved - complete    [shostak](0.30 s)
unique_inv.............................proved - complete    [shostak](0.28 s)
inv_member.............................proved - complete    [shostak](0.28 s)
inv_in.................................proved - complete    [shostak](0.27 s)
divby..................................proved - complete    [shostak](0.27 s)
product_in.............................proved - complete    [shostak](0.26 s)
one_is_subgroup........................proved - complete    [shostak](0.33 s)
group_is_subgroup......................proved - complete    [shostak](0.28 s)
subgroup_is_group......................proved - complete    [shostak](0.25 s)
subgroup_def...........................proved - complete    [shostak](0.40 s)
inv_power..............................proved - complete    [shostak](0.37 s)
power_inv_right........................proved - complete    [shostak](0.26 s)
power_inv_left.........................proved - complete    [shostak](0.27 s)
caret_TCC1.............................proved - complete    [shostak](0.26 s)
caret_TCC2.............................proved - complete    [shostak](0.26 s)
expt_0.................................proved - complete    [shostak](0.26 s)
expt_1.................................proved - complete    [shostak](0.26 s)
expt_m1................................proved - complete    [shostak](0.27 s)
one_expt...............................proved - complete    [shostak](0.28 s)
expt_neg...............................proved - complete    [shostak](0.29 s)
inv_expt...............................proved - complete    [shostak](0.29 s)
expt_def1..............................proved - complete    [shostak](0.46 s)
expt_def2..............................proved - complete    [shostak](0.36 s)
expt_mult..............................proved - complete    [shostak](0.58 s)
expt_div...............................proved - complete    [shostak](0.29 s)
expt_expt..............................proved - complete    [shostak](0.42 s)
expt_commutes..........................proved - complete    [shostak](0.31 s)
expt_inv_right.........................proved - complete    [shostak](0.28 s)
expt_inv_left..........................proved - complete    [shostak](0.27 s)
expt_member............................proved - complete    [shostak](0.32 s)
generated_by_TCC1......................proved - complete    [shostak](0.39 s)
generated_by_lem.......................proved - complete    [shostak](0.26 s)
generated_is_subgroup..................proved - complete    [shostak](0.27 s)
generated_by_is_finite.................proved - complete    [shostak](0.38 s)
center_TCC1............................proved - complete    [shostak](0.32 s)
center_def.............................proved - complete    [shostak](0.30 s)
center_subgroup........................proved - complete    [shostak](0.44 s)
one_left...............................proved - complete    [shostak](0.25 s)
one_right..............................proved - complete    [shostak](0.25 s)
assoc..................................proved - complete    [shostak](0.27 s)
Theory group totals: 61 formulas, 61 attempted, 61 succeeded (18.35 s)

Proof summary for theory group_def
abelian_group?_TCC1....................proved - complete    [shostak](0.26 s)
finite_abelian_group?_TCC1.............proved - complete    [shostak](0.26 s)
finite_group_surj......................proved - complete    [shostak](0.26 s)
Theory group_def totals: 3 formulas, 3 attempted, 3 succeeded (0.78 s)
```

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Proof summary for theory monoid
    IMP_monad_TCC1.........................proved - complete   [shostak](0.25 s)
    IMP_semigroup_TCC1.....................proved - complete   [shostak](0.26 s)
    monoid_TCC1............................proved - complete   [shostak](0.26 s)
    monoid_is_monad........................proved - complete   [shostak](0.30 s)
    monoid_is_semigroup....................proved - complete   [shostak](0.28 s)
    power_0................................proved - complete   [shostak](0.25 s)
    power_1................................proved - complete   [shostak](0.26 s)
    one_power..............................proved - complete   [shostak](0.27 s)
    power_def..............................proved - complete   [shostak](0.35 s)
    power_mult.............................proved - complete   [shostak](0.43 s)
    power_power............................proved - complete   [shostak](0.40 s)
    power_commutes.........................proved - complete   [shostak](0.33 s)
    power_member...........................proved - complete   [shostak](0.33 s)
    one_is_monoid..........................proved - complete   [shostak](0.30 s)
    generated_is_submonoid.................proved - complete   [shostak](0.36 s)
    generated_set_card_1...................proved - complete   [shostak](0.30 s)
    finite_monoid_TCC1.....................proved - complete   [shostak](0.39 s)
    finite_monoid_is_monoid................proved - complete   [shostak](0.31 s)
    finite_monoid_is_finite_monad.........proved - complete   [shostak](0.32 s)
    finite_submonoids......................proved - complete   [shostak](0.27 s)
    commutative_monoid_TCC1................proved - complete   [shostak](0.35 s)
    commutative_monoid_is_monoid..........proved - complete   [shostak](0.32 s)
    commutative_monoid_is_commutative_monad...proved - complete   [shostak](0.32 s)
    commutative_submonoids.................proved - complete   [shostak](0.29 s)
    Theory monoid totals: 24 formulas, 24 attempted, 24 succeeded (7.49 s)

Proof summary for theory monoid_def
    power_TCC1.............................proved - complete   [shostak](0.26 s)
    power_TCC2.............................proved - complete   [shostak](0.25 s)
    generated_set_lem......................proved - complete   [shostak](0.24 s)
    monoid?_TCC1...........................proved - complete   [shostak](0.26 s)
    commutative_monoid?_TCC1...............proved - complete   [shostak](0.25 s)
    finite_commutative_monoid?_TCC1........proved - complete   [shostak](0.26 s)
    Theory monoid_def totals: 6 formulas, 6 attempted, 6 succeeded (1.52 s)

Proof summary for theory monad
    monad_TCC1.............................proved - complete   [shostak](0.26 s)
    one_member.............................proved - complete   [shostak](0.28 s)
    one_in.................................proved - complete   [shostak](0.27 s)
    left_identity..........................proved - complete   [shostak](0.27 s)
    right_identity.........................proved - complete   [shostak](0.26 s)
    unique_left_identity...................proved - complete   [shostak](0.26 s)
    unique_right_identity..................proved - complete   [shostak](0.26 s)
    one_is_monad...........................proved - complete   [shostak](0.33 s)
    trivial_monad_TCC1.....................proved - complete   [shostak](0.30 s)
    monad_is_groupoid......................proved - complete   [shostak](0.29 s)
    sing_one_finite_monad..................proved - complete   [shostak](0.29 s)
    finite_monad_TCC1......................proved - complete   [shostak](0.31 s)
    commutative_monad_TCC1.................proved - complete   [shostak](0.33 s)
    finite_commutative_monad_TCC1.........proved - complete   [shostak](0.31 s)
    order_TCC1.............................proved - complete   [shostak](0.30 s)
    order_is_1.............................proved - complete   [shostak](0.44 s)
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    finite_monad_is_monad.................proved - complete   [shostak](0.30 s)
    commutative_monad_is_monad...........proved - complete   [shostak](0.31 s)
    finite_commutative_monad_is_commutative_monad...proved - complete   [shostak]
(0.32 s)
    finite_commutative_monad_is_finite_monad...proved - complete   [shostak](0.32
s)
    Theory monad totals: 20 formulas, 20 attempted, 20 succeeded (5.99 s)

Proof summary for theory monad_def
    monad?_TCC1..........................proved - complete   [shostak](0.25 s)
    monad?_TCC2..........................proved - complete   [shostak](0.25 s)
    commutative_monad?_TCC1..............proved - complete   [shostak](0.25 s)
    finite_commutative_monad?_TCC1.......proved - complete   [shostak](0.25 s)
    Theory monad_def totals: 4 formulas, 4 attempted, 4 succeeded (1.00 s)

Proof summary for theory semigroup
    fullset_is_semigroup_TCC1............proved - complete   [shostak](0.28 s)
    semigroup_TCC1.......................proved - complete   [shostak](0.28 s)
    semigroup_TCC2.......................proved - complete   [shostak](0.25 s)
    associative..........................proved - complete   [shostak](0.28 s)
    semigroup_is_groupoid................proved - complete   [shostak](0.28 s)
    Theory semigroup totals: 5 formulas, 5 attempted, 5 succeeded (1.37 s)

Proof summary for theory semigroup_def
    semigroup?_TCC1......................proved - complete   [shostak](0.25 s)
    finite_commutative_semigroup?_TCC1....proved - complete   [shostak](0.25 s)
    Theory semigroup_def totals: 2 formulas, 2 attempted, 2 succeeded (0.50 s)

Proof summary for theory groupoid
    fullset_is_groupoid..................proved - complete   [shostak](0.27 s)
    groupoid_TCC1........................proved - complete   [shostak](0.25 s)
    closed...............................proved - complete   [shostak](0.28 s)
    star_closed..........................proved - complete   [shostak](0.27 s)
    Theory groupoid totals: 4 formulas, 4 attempted, 4 succeeded (1.07 s)

Proof summary for theory groupoid_def
    commutative_groupoid?_TCC1...........proved - complete   [shostak](0.25 s)
    finite_commutative_groupoid?_TCC1.....proved - complete   [shostak](0.24 s)
    Theory groupoid_def totals: 2 formulas, 2 attempted, 2 succeeded (0.49 s)

Proof summary for theory cauchy_scaf
    set_seq_TCC1.........................proved - complete   [shostak](0.46 s)
    emptyset_gives_emptyset..............proved - incomplete [shostak](0.47 s)
    emptyset_gives_emptyset1.............proved - incomplete [shostak](0.46 s)
    set_seq_singleton....................proved - incomplete [shostak](0.48 s)
    set_seq_empty........................proved - complete   [shostak](0.47 s)
    add_element_add_set..................proved - incomplete [shostak](0.79 s)
    card_add_element_aux.................proved - incomplete [shostak](0.62 s)
    card_add_element_TCC1................proved - incomplete [shostak](0.49 s)
    card_add_element.....................proved - incomplete [shostak](0.63 s)
    disjoint_add_set.....................proved - incomplete [shostak](0.75 s)
    add_set_is_add_ele...................proved - incomplete [shostak](0.77 s)
    add_set_is_finite_aux................proved - incomplete [shostak](0.64 s)
    add_set_is_finite....................proved - incomplete [shostak](0.71 s)
    card_add_set_TCC1....................proved - incomplete [shostak](0.49 s)
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      card_add_set..........................proved - incomplete [shostak](1.04 s)
      set_seq_is_finite.....................proved - incomplete [shostak](1.28 s)
      set_seq_is_add_set_TCC1...............proved - complete   [shostak](0.48 s)
      set_seq_is_add_set_TCC2...............proved - incomplete [shostak](0.47 s)
      set_seq_is_add_set....................proved - incomplete [shostak](0.00 s)
      card_set_seq_TCC1.....................proved - incomplete [shostak](0.46 s)
      card_set_seq_TCC2.....................proved - complete   [shostak](0.48 s)
      card_set_seq..........................proved - incomplete [shostak](0.96 s)
      Theory cauchy_scaf totals: 22 formulas, 22 attempted, 22 succeeded (13.43 s)

Proof summary for theory top_sylow
      Theory top_sylow totals: 0 formulas, 0 attempted, 0 succeeded (0.00 s)

Grand Totals: 554 proofs, 554 attempted, 554 succeeded (356.27 s)
```