Math 4410 Exercise Set

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HW 1
Historical Exercise Set

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HW 2
Chapter 2
9, 10, 11, 13
Major Exercise 1

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HW 3
Chapter 2
Dr. Frey's Bonus (but required) fun question (DFBBRFQ):
Let $\mathcal{M}$ be a projective plane. Define a new interpretation $\mathcal{M}'$ by taking as "points" of $\mathcal{M}'$ the lines of $\mathcal{M}$ and as "lines" of $\mathcal{M}'$ the points of $\mathcal{M}$, with the same incidence relation. Prove that $\mathcal{M}'$ is also a projective plane (called the *dual plane* of $\mathcal{M}$).
14
Major Exercises 2, 3
Chapter 3
14, 15, 16, 17,

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HW 4
Chapter 3
24, 27, 28, 32, 35
Chapter 4
5(first part only), 17

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HW 5
Chapter 4
1a, 10, 15, 19
20a, 21, 28 (only the part where you "prove that if one pair of opposite sides has this property, then so does the other pair of opposite sides.)
Chapter 5
9 (Compare with #19 in Ch. 4)

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HW 6
Chapter 5
1, 2, 6, 16

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HW 7
Chapter 6
2, 3, 6, 7, 8, 12
Major Exercises 3, 11

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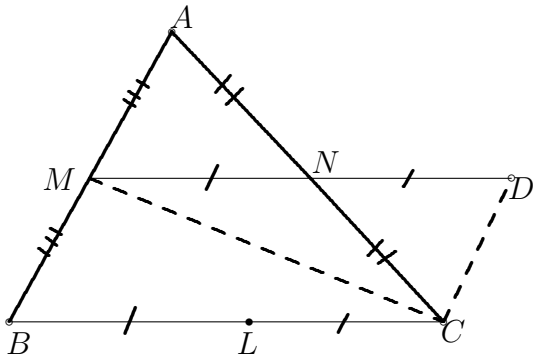
HW 8
Chapter 6
9

Dr. Frey's Bonus (but required) fun question (DFBBRFQ):

Let $\triangle ABC$ be any triangle, and let L, M, and N be the midpoints of BC, AB and AC, respectively. Prove that $\triangle AMN$ is *not* similar to $\triangle ABC$. (Hint: Otherwise defect $\square MBCN = 0$.) Prove that MN is *not* congruent to BL by assuming the contrary and deducing that $\triangle ABC$ has angle sum 180°. (Hint: Choose D such that $M * N * D$ and $ND \cong MN$. Show that $\triangle ANM \cong \triangle CND$, then that $\triangle MDC \cong \triangle CBM$. Substitute appropriately in the equation $180° = (\measuredangle BMC)° + (\measuredangle CMD)° + (\measuredangle AMN)°$ to get the result.)



Chapter 7
K2, K3, K5

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HW 9
Chapter 7
K11, K20

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HW 10
Chapter 6
10, 11
Chapter 7
P2, P6, P13

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HW 11
Chapter 7
K4, P3

Dr. Frey's Bonus (but required) fun question (DFBBRFQ):

Let ℓ be a Poincaré line that is not a diameter of γ; ℓ is then an arc of a circle δ orthogonal to γ. Prove that hyperbolic reflection across ℓ is represented in the Poincaré model by inversion in δ. (Hint: Use Proposition 7.10 and the corollary to Proposition 7.6.)

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