Problem 1:

Problem 2:

Problem 3:

Problem 4:

Let $f \in H(\mathbb{C})$ and $|f(z)| \leq e^{\mathrm{Re}(z)}$ for all z.

Then $\left|\frac{f(z)}{e^{\mathrm{Re}(z)}}\right| = \left|\frac{f(z)}{e^z}\right| \leq 1$ for all z. That is, $\frac{f(z)}{e^z}$ is a bounded entire function: it's constant. So $\frac{f(z)}{e^z} = c$ for some $c \in \mathbb{C}$: $f(z) = ce^z$ for some $c \in \mathbb{C}$.

Problem 5:

Problem 6:

Problem 7:

Problem 8:

Problem 9:

Problem 10:

Problem 11:

Problem 12:

Problem 13:

Problem 14:

Problem 15:

Problem 16:

Problem 17:

Problem 18:

Problem 19:

Problem 20: