Exercise Set #2

Exercise 1: The following exercises relates two surgery descriptions of the Poincaré homology sphere.

a Show that the two framed links are equivalent.

b Show that these two framed links are also equivalent.

Exercise 2: Let $K$ and $K'$ be unlinked knots in $S^3$ with framings $n$ and $n'$. Show that the framed link formed by linking $K$ and $K'$ with a 0-framed unknot is equivalent to a $K \# K'$ with framing $n + n'$.

Exercise 3: Let $M$ be a 4-manifold obtained by attaching $l$ 2-handles to a 0-handle along an $l$ component framed link.

a What is $\partial M$?

b Compute the homology $H_*(M)$.

Exercise 4: What effects do the Kirby moves K1 and K2 have on the linking matrix?

Exercise 5: Find a handle decomposition of $S^1 \times S^1$. What about $S^1 \times S^1 \times S^1$? What about $S^1 \times S^1 \times S^1 \times S^1$?