Quiz 18 **MATH-1100-ES32** **2011 November 18**

Simplify each expression. (Show at least one intermediate step for each.)

1 $7\sqrt{10} - 6\sqrt{3}$

Since $10 = 2 \cdot 5$ with no nontrivial square factors, $\sqrt{10}$ cannot be reduced; similarly, $\sqrt{3}$ cannot be reduced. Since $10 \neq 3$, the terms cannot be combined. Therefore, this is already simplified:

$$7\sqrt{10} - 6\sqrt{3}.$$

2 $\left(2 - 7\sqrt{3}\right)\left(5 + 4\sqrt{3}\right)$

As with a polynomial, multiply every term by every term, and remember that $\left(\sqrt{3}\right)^2 = 3$:

$$\begin{aligned}\left(2 - 7\sqrt{3}\right)\left(5 + 4\sqrt{3}\right) &= (2)(5) + (2)\left(4\sqrt{3}\right) + \left(-7\sqrt{3}\right)(5) + \left(-7\sqrt{3}\right)\left(4\sqrt{3}\right) = 10 + 8\sqrt{3} - 35\sqrt{3} - 28\left(\sqrt{3}\right)^2 \\ &= 10 + 8\sqrt{3} - 35\sqrt{3} - 28(3) = 10 + 8\sqrt{3} - 35\sqrt{3} - 84 = -74 - 27\sqrt{3}.\end{aligned}$$

3 $\sqrt[3]{8z^4} - 2z\sqrt[3]{-27z} + \sqrt[3]{125z}$

I reduce each radical, then collect like terms:

$$\sqrt[3]{8z^4} - 2z\sqrt[3]{-27z} + \sqrt[3]{125z} = 2z\sqrt[3]{z} - 2z(-3\sqrt[3]{z}) + 5\sqrt[3]{z} = 2z\sqrt[3]{z} + 6z\sqrt[3]{z} + 5\sqrt[3]{z} = 8z\sqrt[3]{z} + 5\sqrt[3]{z}.$$