Note: There are no points for solving this problem. All points are for setting up the equations, plugging in the relevant numbers, and stating what you want to solve for.

Given the following returns over the past four years (June 1 through June 1of each year), calculate the beta of Proctor & Gamble (PG) and the beta of a portfolio where you invest $100,000 in Proctor & Gamble and $400,000 in BlackRock which has a beta of 1.37.

| | Return on: | |
Year	PG	S&P500
2012	0%	+3%
2011	+9%	+28%
2010	+21%	+12%
2009	− 14%	− 28%

$$+5\left(\beta_p = X_{PG}\beta_{PG} + X_{BR}(1.37) \right)$$

$$+2\left(X_{PG} = \frac{100,000}{100,000+400,000} \right) ; \left(X_{BR} = \frac{400,000}{100,000+400,000} \right)$$

$$+5\left(\beta_{PG} = \frac{COV_{PG\text{-}S\&P}}{Var_{S\&P}} \right)$$

$$+5\left(COV_{PG\text{-}S\&P} = \frac{1}{3}\left[(0-\bar{R}_{PG})(3-\bar{R}_{S\&P}) + (9-\bar{R}_{PG})(28-\bar{R}_{S\&P}) \right.\right.$$
$$\left.\left. + (21-\bar{R}_{PG})(12-\bar{R}_{S\&P}) + (-14-\bar{R}_{PG})(-28-\bar{R}_{S\&P}) \right] \right)$$

$$+2\left(\bar{R}_{PG} = \frac{1}{4}(0+9+21-14) \right)$$

$$+2\left(\bar{R}_{S\&P} = \frac{1}{4}(3+28+12-28) \right)$$

$$+5\left(Var_{S\&P} = \frac{1}{3}\left((3-\bar{R}_{S\&P})^2 + (28-\bar{R}_{S\&P})^2 + (12-\bar{R}_{S\&P})^2 + (-28-\bar{R}_{S\&P})^2 \right) \right)$$