1. We are looking for $\frac{1}{a}+\frac{1}{b}=\frac{a+b}{ab}$. We know $a+b=11$, so all we need to do is find $ab$. Start by cubing $a+b=11$: $(a+b)^3=a^3+3a^2b+3ab^2+b^3=1331$. We know $a^3+b^3=121$, so substitute this: $3a^2b+3ab^2+121=1331 \Rightarrow 3a^2b+3ab^2=1210$. Now factor: $3ab(a+b)=1210$, and we substitute $a+b=11$: $3\cdot 11ab=1210 \Rightarrow ab=\frac{110}{3}$. So then $\frac{a+b}{ab}=\frac{11}{\frac{110}{3}}=\boxed{\frac{33}{110}}$

2. $\boxed{12}$

3. Manipulate the second equation so you get $a=\frac{4}{3}b$, and substitute in the first equation: $9(\frac{4}{3}b)^2-8b^2=16b^2-8b^2=8b^2=1800$, so $b^2=225$, so $b=15$. Now solve for $a$: $a=\frac{4}{3}(15)=20$. So $ab=15\cdot 20=\boxed{300}$

4. $\boxed{9}$

5. $\boxed{52}$

6. $\boxed{12}$

7. $\boxed{\frac{83}{48}}$

8. $\boxed{2}$

9. $\boxed{\frac{81}{64}}$

10. For an exponent to equal 1, then the base must be 1 (or -1 and raised to an even exponent) or the exponent must be 0. So if the base is 1, then $x=3$. If the base is -1, then $x=1$, and the exponent would be 24, which is even, so it works. Then if the exponent is zero, then $25-x^2=(5-x)(5+x)=0$, so $x=5,-5$. So there are $\boxed{4}$ solutions.