5th Lent Term Test

1. In triangle ABC, $AB = 7$, $AC = 11$ and $B\hat{A}C = 100°$.
   (a) Find length BC. $\boxed{14.0264\ldots}$
   (b) Find angle $A\hat{B}C$. $\boxed{50.56\ldots}$
2. In triangle XYZ, $XY = 11$, $YZ = 6$ and $Y\hat{X}Z = 20°$.
   (a) Find angle $X\hat{Y}Z$. $\boxed{18.83\ldots \text{ or } 121.168\ldots}$
   (b) Find the area of the triangle. $\boxed{10.65\ldots \text{ or } 28.236\ldots}$
3. The area of triangle PQR is 10. If $PQ = 5$ and $PR = 8$, find $Q\hat{P}R$. $\boxed{30° \text{ or } 150°}$
4. The area of triangle DEF is 7. If $DE = x - 1$ and $DF = x + 2$ and $EDF = 30°$, find x. $\boxed{x = 5}$
5. Solve $\sin x = 0.2$ in the range $0° < x < 720°$. $\boxed{x = 11.54, 168.46, 371.54, 528.46}$
6. Solve $5\cos x + 1 = \frac{1}{2}$ in the range $-360° < x < 360°$. $\boxed{\pm 95.74, \pm 264.26}$
7. Simplify $\dfrac{x^2 + 2x - 3}{2x^2 + 7x + 3}$. $\boxed{\frac{x-1}{2x+1}}$
8. Simplify $\dfrac{2t^2 - 3t - 9}{4t^2 - 9}$. $\boxed{\frac{t-3}{2t-3}}$
9. Simplify $\dfrac{e^2 - 5e + 6}{e^2 + 2e - 3} \div \dfrac{3e - 9}{2e^2 + 6e}$. $\boxed{\frac{2e(e-2)}{3(e-1)}}$
10. Write as a single fraction (simplifying your answer)
    (a) $\dfrac{3x - 5}{4} + \dfrac{x - 7}{6}$. $\boxed{\frac{11x-29}{12}}$
    (b) $\dfrac{4x + 1}{8} + \dfrac{7x - 3}{12}$. $\boxed{\frac{26x-3}{24}}$
11. Solve using the formula (simplifying your answer fully)
    (a) $2x^2 + 3x = 7$. $\boxed{-\frac{3}{4} \pm \frac{\sqrt{65}}{4}}$
    (b) $\dfrac{1}{x} + \dfrac{1}{x + 1} = 4$. $\boxed{-\frac{1}{4} \pm \frac{\sqrt{5}}{4}}$
12. Rationalize the denominator and simplify:
    (a) $\dfrac{49}{\sqrt{7}}$. $\boxed{7\sqrt{7}}$
    (b) $\dfrac{a}{\sqrt{a}}$. $\boxed{\sqrt{a}}$
    (c) $\dfrac{4}{1 - \sqrt{2}}$. $\boxed{-4 - 4\sqrt{2}}$
    (d) $\dfrac{\sqrt{a}}{1 + \sqrt{a}}$. $\boxed{\frac{\sqrt{a}-a}{1-a}}$
13. In how many ways can one choose two different numbers from the set
$$\{1, 2, 3, \ldots, 2005, 2006\}$$
so that the sum of each pair is an even number?