Quadratic and Exponential Functions Homework

1. $y = -2x^2 + 4x + 6$
    $y = -2(x^2 - 2x - 3)$
    $y = -2(x-3)(x+1)$

    x-ints: 3 & -1
    y-int: 6

    $y = -2x^2 + 4x + 6$
    $y = -2(x^2 - 2x + 1 - 1) + 6$
    $y = -2(x^2 - 2x + 1) + 2 + 6$
    $y = -2(x-1)^2 + 8$

    vertex → (1, 8)

2. $y = a(x-d)^2 + c$
    $y = a(x-4)^2 + 8$ ← x-int
    sub in (6, 0)
    $0 = a(6-4)^2 + 8$
    $0 = 4a + 8$
    $\dfrac{-8}{4} = \dfrac{4a}{4}$
    $a = -2$

    $y = -2(x-4)^2 + 8$

3. $y = a(x-x_1)(x-x_2)$
    $y = a(x-3)(x+3)$ ← y-int
    sub in (0, -27)
    $-27 = a(0-3)(0+3)$
    $\dfrac{-27}{-9} = \dfrac{-9a}{-9}$
    $a = 3$

    $y = 3(x-3)(x+3)$

4a) $x^2 - 8x + 10 = 0$
    $b^2 - 4ac$
    $= (-8)^2 - 4(1)(10)$
    $= 64 - 40$
    $= 24$ ← positive
    ∴ Two real roots.

b) $x^2 + 4x + 10 = 0$
    $b^2 - 4ac$
    $= (4)^2 - 4(1)(10)$
    $= 16 - 40$
    $= -24$ ← negative
    ∴ Zero real roots.

5. a) $2x^2 + 7x + 3 = 0$

$2x^2 + 6x + x + 3 = 0$

$2x(x+3) + 1(x+3) = 0$

$(2x+1)(x+3) = 0$

$2x+1 = 0 \qquad x+3 = 0$

$\dfrac{2x}{2} = \dfrac{-1}{2} \qquad \boxed{x = -3}$

$\boxed{x = -\dfrac{1}{2}}$

$\left.\begin{array}{l} P(6) \\ S(7) \end{array}\right\} 6, 1$

b) $x^2 + 5x + 7 = 0$

$(\sim\sim\sim)(\sim\sim\sim) = 0$

can't factor?

$b^2 - 4ac$

$= (5)^2 - 4(1)(7)$

$= 25 - 28$

$= -3 \leftarrow$ negative

$\therefore$ $\boxed{\text{No solutions.}}$

6. a) $16^{3/2}$

$= (16^{1/2})^3$

$= (\sqrt[2]{16})^3$

$= (4)^3$

$= 64$

b) $125^{-\frac{2}{3}}$

$= \dfrac{1}{125^{2/3}}$

$= \dfrac{1}{(\sqrt[3]{125})^2}$

$= \dfrac{1}{(5)^2}$

$= \dfrac{1}{25}$

7. a) $6^{3x-5} = 36^{x+3}$

$6^{3x-5} = (6^2)^{x+3}$

$6^{3x-5} = 6^{2x+6}$

$3x - 5 = 2x + 6$

$3x - 2x = 6 + 5$

$\boxed{x = 11}$

b) $5^x = 1050$

$\log 5^x = \log 1050$

$\dfrac{x \log 5}{\log 5} = \dfrac{\log 1050}{\log 5}$

$\boxed{x \cong 4.32}$

8. $y = a(1+r)^t$

$y = 200(1 + 0.25)^t$

$y = 200(1.25)^t$

set $y = 10000$

$\dfrac{10000}{200} = \dfrac{200(1.25)^t}{200}$

$50 = (1.25)^t$

$\dfrac{\log 50}{\log(1.25)} = \dfrac{t \log(1.25)}{\log(1.25)}$

$\boxed{t \cong 17.5 \text{ hours}}$