1a. (14000, 24) (21000, 20)

$$m = \frac{20-24}{21000-14000} = \frac{-4}{7000} = -\frac{1}{1750}$$

$$y - 20 = -\frac{1}{1750}(x - 21000)$$

$$y - 20 = -\frac{1}{1750}x + 12$$

$$+20 \qquad +20$$

$$y = -\frac{1}{1750}x + 32$$

$$\boxed{P = -\frac{1}{1750}x + 32}$$

1b. $R(x) = xp$

$$R(x) = x\left(-\frac{1}{1750}x + 32\right)$$

$$R(x) = -\frac{1}{1750}x^2 + 32x$$

$$R'(x) = -\frac{2}{1750}x + 32$$

$$R'(x) = -\frac{1}{875}x + 32 = 0$$

$$\frac{1}{875}x = 32(875)$$

$$x = 28000$$

$$P = -\frac{1}{1750}(28000) + 32$$

$$= 16$$

$\boxed{\$16}$

2. $f(x) = x^3 - 2x - 5$

$f(2) = 2^3 - 2(2) - 5 = -1$

$f'(x) = 3x^2 - 2$

$f'(2) = 3(2)^2 - 2 = 10$

$$X_2 = 2 - \frac{-1}{10} = \boxed{2.1}$$

3. $f'(\theta) = -\cos\theta + \sin\theta + C_1$

$f'(0) = -\cos 0 + \sin 0 + C_1 = 7$

$-1 + 0 + C_1 = 7$

$C_1 = 8$

$f'(\theta) = -\cos\theta + \sin\theta + 8$

$f(\theta) = -\sin\theta - \cos\theta + 8\theta + C_2$

$f(0) = -\sin 0 - \cos 0 + 8(0) + C_2 = 10$

$0 - 1 + 0 + C_2 = 10$

$C_2 = 11$

$\boxed{f(\theta) = -\sin\theta - \cos\theta + 8\theta + 11}$

4. $a(t) = -32$

$v(t) = -32t + C_1$ Velocity

$v(0) = -32(0) + C_1 = 0$

$C_1 = 0$

$v(t) = -32t$

$h(t) = \frac{-32t^2}{2} + C_2$ height

$h(t) = -16t^2 + C_2$ ← C_2 is the height of the cliff because C_2 is height at time $t = 0$

$v(t) = \frac{-32t}{-32} = \frac{-200}{-32}$

$t = 6.25$ ← Time stone hits ground

$h(6.25) = -16(6.25)^2 + C_2 = 0$

$-625 + C_2 = 0$

$C_2 = 625$

$\boxed{625 \text{ ft}}$

5. base $= \frac{5 - -3}{4} = \frac{8}{4} = 2$

$\text{Area} \approx 2\left(f(-3) + f(-1) + f(1) + f(3)\right)$

$\text{Area} \approx 2\left((6 + (-3)^2) + (6 + (-1)^2) + (6 + 1^2) + (6 + 3^2)\right)$

$\text{Area} \approx 2(15 + 7 + 7 + 15)$

$\text{Area} \approx 2(44)$

$\boxed{\text{Area} \approx 88 \text{ sq. units}}$