

• Problem 4 (HW):

$$\begin{aligned} (a) \tilde{P}_x &= (x-1, q; 0, 1-q) & z_1 &= x-1, z_2 = 0 \\ &= (x-1, 2-x; 0, x-1) & q &= 2-x \end{aligned}$$

(b) * How to calculate overall value:

$$\begin{aligned} V(z_1, q; z_2, 1-q) &= v(z_2) + q(v(z_1) - v(z_2)) \\ \text{or } V(\tilde{P}_x) &= qv(x-1) + (1-q)v(0) \end{aligned}$$

* Back to Part (a):

$$(1.25-1, 2-1.25; 0, 1.25-1) = (0.25, 0.75; 0, 0.25)$$

* Back to Part (b):

$$\begin{aligned} V(\tilde{P}_x) &= qv(x-1) + (1-q)v(0) \\ &= v(z_2) + q(v(z_1) - v(z_2)) \end{aligned}$$

$$\begin{aligned} &= v(0) + (2-x)(v(x-1) - v(0)) \\ &= 0 + (2-x)(v(x-1) - 0) \end{aligned}$$

$$\Rightarrow V(\tilde{P}_x) = (2-x)(v(x-1)) = (2-x)(x-1)^{0.5}$$

$$\begin{aligned} &= 0.75(0.25)^{0.5} = (2-x)(x-1)^{0.5} = 2(x-1)^{0.5} - x(x-1)^{0.5} \\ &= 0.75(0.5) \end{aligned}$$

$$V(\tilde{P}_{1.25}) = 0.375$$

$$(c) V(\tilde{P}_x) = 2(x-1)^{0.5} - x(x-1)^{0.5}$$

$$\frac{dV(\tilde{P}_x)}{dx} = [2(0.5(x-1)^{0.5-1})(1)] - [(x-1)^{0.5} + x(0.5(x-1)^{-0.5})]$$

$$\begin{aligned} &= (x-1)^{-0.5} - (x-1)^{0.5} - 0.5x(x-1)^{-0.5} \\ &= (x-1)^{-0.5}(1-0.5x) - (x-1)^{0.5} \end{aligned}$$

$$\text{Set } \frac{dV(\tilde{P}_x)}{dx} = 0$$

$$\Rightarrow (x-1)^{-0.5}(1-0.5x) - (x-1)^{0.5} = 0$$

$$(x-1)^{0.5} = \frac{1-0.5x}{(x-1)^{0.5}}$$

$$(x-1)^{0.5}(x-1)^{0.5} = 1-0.5x$$

$$(x-1) = 1-0.5x$$

$$1.5x = 2 \Rightarrow x = \frac{4}{3} = 1.33$$