

Problem Set 2 - SOLUTIONS

Econ 3391

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1 Discounting - Buying a car

The new Toyota RAV4 comes in two versions, a combustion engine and a hybrid. The hybrid saves you \$200 per year in gas money.

1.1 How much is this gas savings worth in present value terms?

Assume you plan to keep the car five years, and your annual discount rate is 20%. Assume that all expenditures occur at the end of the year.

$$PV = \sum_{t=1}^{t=5} 200 / (1.2)^t$$

$$PV = 200 * \sum_{t=1}^{t=5} 1 / (1.2)^t = 200 * 2.906 = 598.12$$

1.2 If the hybrid costs \$500 more up front, what is the minimum amount the hybrid needs to save you in gas money each year in order to justify the upgrade?

Assume the price difference needs to be paid for up front (at time 0).

$$PV = X \sum_{t=1}^{t=5} 1 / (1.2)^t$$

$$500 = X * 2.906 \quad X = 168$$

2 Discounting - Saving the planet

[This problem is taken from Berck & Helfand, Ch 14.]

An activity to improve the well-being of some impoverished people will provide benefits of \$1 million right now, but it will obliterate the earth in 200 years. The world's value in 200 years is projected at \$10¹². There are no costs or benefits between these two dates.

2.1 Is it worth avoiding the world's destruction in 200 years at a 10 percent discount rate?

$PV = 10^{12} / (1.1)^{200} = \5265.78 . No, it's not worth saving: We're better off using the money now for projects that will benefit us in the meantime.

2.2 Is it worth avoiding the world's destruction in 200 years at a 6 percent discount rate?

$PV = 10^{12} / (1.06)^{200} = \$8,686,142.44$. Yes, it's worth saving now: Saving the world is more valuable than whatever we might do with the money in the meantime.