Quiz 5 (answer key)
ECNS 432
Spring 2018

_____Name

1.) (10 points) Suppose MSU is trying to decide how to use a piece of land. One option is to put up an outdoor rock climbing wall with an expected life of 3 years. Another is to install an outdoor swimming pool with an expected life of 6 years. The climbing wall would cost $120,000 to construct and would yield net benefits of $46,000 at the end of each of the 3 years. The swimming pool would cost $500,000 and would yield net benefits of $100,000 at the end of each of the 6 years. Each project is assumed to have zero salvage value at the end of its life. Using a real discount rate of 5 percent, which project offers larger net benefits? (HINT: Notice that the proposed project lengths are not the same.)

As only one of these projects can be built on the site, they are mutually exclusive. The comparison is complicated because the swimming pool has an expected life two times longer than the rock climbing wall.

Consider first the NPV of each project separately:

NPV(one climbing wall project)

$$= -\$120{,}000 + \sum_{i=1}^{3} \frac{46{,}000}{(1+0.05)^i} = \$5{,}269$$

NPV(one swimming pool project)

$$= -\$500{,}000 + \sum_{i=1}^{6} \frac{100{,}000}{(1+0.05)^i} = \$7{,}569$$

If we choose on the basis of this comparison, then the swimming pool has a larger present value of net benefits. However, this is not appropriate as the projects are of different lengths. One possible correct approach is the following:

One could choose between one swimming pool and two successive climbing wall projects so that the site is used in each case for the same length of time.

NPV(two successive climbing wall projects)
$= \$5{,}269 + \$5{,}269/(1+.05)^3$
$= \$9{,}821$

Thus, two successive climbing wall projects offer a higher present value of net benefits than the swimming pool project. One should build the climbing wall.

2.) (10 points total) The initial cost of constructing a temporary dam that is expected to last for 3 years is $100 million. The expected net benefits for each year are as follows:

yr. 1: $28 million
yr. 2: $34 million
yr. 3: $42 million

Under which of the following scenarios should we construct the dam? (make sure to show your work)

a.) (3 points) Benefits accrue at the end of each year and the real discount rate is 5%.

PV of Net Benefits = $[\$28/1.05 + \$34/1.05^2 + \$42/1.05^3] - \$100 < 0$

⇨ Don't construct the dam

b.) (3 points) Benefits accrue at the beginning of each year and the real discount rate is 5%.

PV of Net Benefits = $[\$28/ + \$34/1.05 + \$42/1.05^2] - \$100 < 0$

⇨ Don't construct the dam

c.) (4 points) Benefits accrue at mid-year and the real discount rate is 2%.

PV of Net Benefits = $[\$28/1.02^{.5} + \$34/1.02^{1.5} + \$42/1.02^{2.5}] - \$100 > 0$

⇨ Build it!