Estimating well IPR with test data

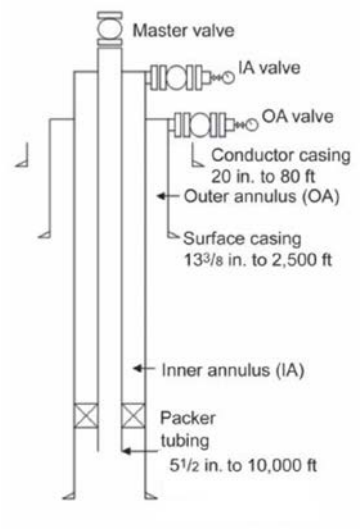
The Prudhoe bay field is a large oil field on Alaska's North Slope. The field has been producing since 1977 and it is currently producing around half a million barrels per day.

The field has 1330 wells, from which 591 are naturally flowing. The wells shut-in pressure is 166 bara (corresponding to a reservoir pressure of 400 bara). The wells are arranged in production modules that provide protection and insulation to the Christmas trees from the harsh artic environment. The various modules are connected through flowlines to the main three gathering centers of the field (GC-1, GC-2 and GC-3).

You are a production engineer in the field responsible for Well P2-15.**You have been asked to perform the following tasks:**

- Well P2-15 has been tested recently giving a wellhead pressure of 80 bara, q_o = 1272 Sm^3/d, GOR=146.2 Sm^3/Sm^3. With the data measured and the well layout provided below, estimate the flowing bottom-hole pressure. Use the value calculated to estimate the productivity index of the formation J, $q_{\bar{o}} = J \cdot \left(p_R - p_{wf}\right)$.

A typical well completion of the producing wells in the Prudhoe Bay is shown below:



Suggestions:

-Use the procedure shown in class to calculate the bottom-hole pressure departing from the wellhead. Use 5 intervals and Euler's method for explicit numerical integration. Use Hysys as a compositional fluid property calculator. Assume that the fluid temperature distribution is known a priori and goes linearly from 100 °C at reservoir conditions to 20 °C at the wellhead.

The standard conditions density of the oil is 721.4 kg/m^3

The standard conditions density of the gas is 0.8721 kg/m^3

	Mole Fractions
Nitrogen	0.0037
CO2	0.0011
Methane	0.4325
Ethane	0.0472
Propane	0.0297
i-Butane	0.0149
n-Butane	0.0093
i-Pentane	0.0083
n-Pentane	0.0050
n-Hexane	0.0183
n-Heptane	0.0411
n-Octane	0.0495
n-Nonane	0.0381
22-Mpropane	0.0002
n-Decane	0.3012