Q-1
a) $V_{out} = V_{bigin} - R \frac{\partial I_C}{\partial V_{in}} V_{IN}$

b) $V_{out} = V_{bigin} - R \frac{\partial I_C}{\partial V_{in}} V_{IN}$

total 5 pts: +2 flat top for $V_{in} < V_{bigin}/10$
+2 steep slope
+1 curve never goes to zero

c) $V_{out} = V_{bigin} - R \frac{\partial I_C}{\partial V_{in}} V_{IN}$

total 5 pts: +3 $V_{out} = 0$ for $V_{in} < V_{bigin}/10$
+2 identify slope $\leq 1.0$

d) $V_{out} = V_{bigin} - R \frac{\partial I_C}{\partial V_{in}} V_{IN}$

total 5 pts: +3 y-intercept $= -V_{bigin}/10$
+2 identify slope $\leq 1.0$
To motivate the practice of verify circuit understanding with simulation, below is a quick implementation of the 3 circuits and their corresponding simulation results.

Q-2)
Walk N \rightarrow 10\text{cm/step}; \text{ Walk E} \rightarrow 0.1\text{cm/step}

a) 10*0.1 = 1\text{cm elevation} \quad +3: \text{Formulate correct expression} +2: \text{Correct numerical value}

b) 10*10 = 100\text{cm elevation} \quad +3: \text{Formulate correct expression} +2: \text{Correct numerical value}

+2: \text{Formulate correct expression} +2: \text{Correct direction} +1: \text{Correct number of required steps}

c) After walking 10 steps N, elevation = 100\text{cm}. To neutralize we need -100\text{cm}, which can be gained by walking in opposite to East direction for 100\text{cm} \rightarrow -100/0.1 = 1000 \text{steps in West direction.} 

+3: \text{Formulate correct expression} +2: \text{Correct numerical value}

d) Intrinsic Gain = -\text{Change in altitude climbing North/ Climbing East} = -10\text{cm/1mm} = -100

If 1 step in North (gate) is taken it increases altitude (current) by 10\text{cm}. Thus, intrinsic gain = 10\text{cm}. Note that generally, gain has no units. Here its expressed in “cm” as steps are not quantified in “cm”.

+5: only for correct answer

e) Yes
Q-3) As shown below, the slope of G changes. Thus, it depending on which point one starts to mine gold, the return would surely vary.

To mine the most gold, as per figure below, one should work at the midway somewhere around 50yrs. If one wants to work for 1 year from the midway: 1.8e-6 fraction of total gold can be mined.

Lastly, as the maxima is flat and the x-axis is in the years, probably the rate of gold mining will not change from month to month. Rather would stay fixed for practical purpose.

For Q-3) refer to the rubric on page-6
Q-4a) For each sub-question: Total 5pts
+2: For getting the shape of the plot correct
+3: For getting the values of for the plot correct

Q-4b,c,d) All on one figure
Q-5) [Only for EE240a students]

A 3D plot for an ideal BJT device is shown below:

We choose MOSFET AO6408 for our simulation.  
Comment:  
In a real device, gain depends on both the control voltage and the output voltage. The control voltage changes the biasing point, which strongly affects the gain.  
As shown in the plot below, with increasing control voltage the gain reaches a peak value and drops for further increase. This peak value further can be influenced by control the output voltage. Higher the output voltage, larger can be the peak gain.
Grading rubric:
First, please identify whether you belong to EE140/240a.

Rubric for EE140:
Max. points: 100
Q-1) Total points 20
   a) 5 b) 5 c) 5 d) 5

Q-2) Total points: 25
   a) 5 b) 5 c) 5 d) 5 e) 5

Q-3) Total points: 35
   a) Gold in an hour: 10 b) Max gold extraction: 10 c) Month to month rate change: 15

Q-4) Total points: 20
   a) 5 b) 5 c) 5 d) 5 e) 5

Rubric for EE240a:
Max. points: 135
Q-5) Total points 35
   3D plot for device-1: 10
   3D plot for device-1: 10
   3D plot for device-1: 10
   Comment on gain vs. bias point: 5

Grading guidelines:
1) It important to get the approach right. You should grade a right approach at 60% for grade.
   E.g. 3/5
2) Next, important point is to get right numerical answer. Full grade is reserved for this purpose.
3) Numerical error should cost you 20%
   E.g. 1 numerical error in a 5pt problem is 4/5
4) If approach is correct and problem has multiple numerical error, you at least get 60%
   E.g. 3 numerical error in a 5pt problem is 3/5