Question 1

In each case an investment grows from an initial value \( P \) to a final value \( S \) over \( T \) years. Give both the annual ordinary compound growth rate and the annual continuously compounded growth rate

(a) \( P=100, \ S=17000, \ T=34 \)
(b) \( P=3.84, \ S=7.38, \ T=3 \)
(c) \( P=13.35, \ S=425.6, \ T=45 \)

Question 2

Consider the following two equations

\[ S = P(1 + r)^T \quad \text{(1)} \]
and
\[ S = Pe^{rT} \quad \text{(2)} \]

(a)

a. If a contract specifies a continuously compounding rate of 5\% p.a. how long until the investment increases by 80\%? Increases by 80\% means that the growth factor \( S/P = 1.8 \)

b. If the contract specifies an ordinary compounding rate of 5\% p.a. how long until the investment increases by 80\%?

(b)

a. If contract specifies a continuously compounding rate and you wish your investment to double within 10 years, what annual rate do you require?

b. Do the same for a contract which specifies ordinary compounding.

(c) You have the choice of the following three investments

a. 1.5\% per quarter, continuously compounding

b. 0.55\% per month ordinary compounding

c. 3.2\% semi annually ordinary compounding

Which investment would you choose to maximize your return?
**Question 3**

Give an equation of the form $y=mx+b$.

(a) When $x=0$, $y=2$. For each increase in $x$, $y$ decreases by 2.

(b) When $x=3$, $y=0$ while when $x=0$, $y=4$

(c) When $x=2$, $y=5$ and when $x=9$, $y=5$

(d) When $y=0$, $x=4$ and for each 2 unit increase in $x$, $y$ decreases by 1 unit

(e) When price $x$ equals the unit cost 8 the quantity $y$ supplied is 0. For each 50 cents above this price, the quantity supplied increases by 3 units.

**Question 4**

(a) Suppose the demand function is given by $Q=200-10P$

and the supply function is $S=5P-25$. Find the equilibrium price and quantity.

(b) Suppose that demand decreases by 5 units for every increase in price of $2$, and that when price equals $60$ the demand is zero. Suppose further that the quantity supplied is zero for the price is less then or equal to $20$ and that for each $1$ increase in price the quantity supplied increases by 4 units. Find the equilibrium quantity and price.