

1. (a) $A(3) = 10000\left(1 + \frac{0.085}{4}\right)^{4(3)} = 10000(1.02125^{12}) = 12870.19$. Thus the amount after 3 years is \$12,870.19.

(b) $20000 = 10000\left(1 + \frac{0.085}{4}\right)^{4t} = 10000(1.02125^{4t}) \Leftrightarrow 2 = 1.02125^{4t}$

about 8.24 years.

Thus the investment will double in

2. (a) $A(2) = 6500 e^{0.06(2)} \approx \7328.73

(b) $8000 = 6500 e^{0.06t} \Leftrightarrow \frac{16}{13} = e^{0.06t}$

So the investment doubles in about $3\frac{1}{2}$ years.

4. $5000 = 4000\left(1 + \frac{0.0975}{2}\right)^{2t} \Leftrightarrow 1.25 = (1.04875)^{2t}$

So it takes about $2\frac{1}{3}$ years to save \$5000.

9. (a) $n(0) = 500$.

(b) The relative growth rate is $0.45 = 45\%$.

(c) $n(3) = 500e^{0.45(3)} \approx 1929$.

(d) $10000 = 500 e^{0.45t} \Leftrightarrow 20 = e^{0.45t}$
6 hours 40 minutes.

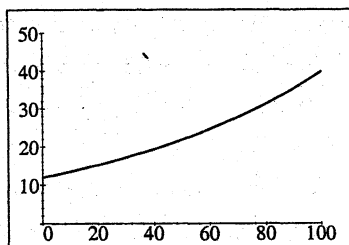
10. (a) The relative growth rate is $0.012 = 1.2\%$.

(b) $n(5) = 12 e^{0.012(5)} = 12 e^{0.06} \approx 12.74$
million fish.

(c) $30 = 12 e^{0.012t} \Leftrightarrow 2.5 = e^{0.012t}$

Thus the fish population reaches 30 million after about 76 years.

(d)



17. (a) $2n_0 = n_0 e^{0.02t} \Leftrightarrow 2 = e^{0.02t}$

by the year 2029.

the population will double

(b) $3n_0 = n_0 e^{0.02t} \Leftrightarrow 3 = e^{0.02t}$

triple by the year 2049.

the population will

22. (a) $m(60) = 40 e^{-0.0277(60)} \approx 7.59$, so the mass remaining after 60 days is about 8 g.

(b) $10 = 40 e^{-0.0277t} \Leftrightarrow 0.25 = e^{-0.0277t}$
so it takes about 50 days.

(c) We need to solve for t in the equation $20 = 40 e^{-0.0277t}$. We have $20 = 40 e^{-0.0277t} \Leftrightarrow e^{-0.277t} = \frac{1}{2}$
Thus the half-life of thorium-234 is about 25 days.

29. (a) $T(0) = 65 + 145 e^{-0.05(0)} = 65 + 145 = 210^\circ\text{F}$.

(b) $T(10) = 65 + 145 e^{-0.05(10)} \approx 152.9$. Thus the temperature after 10 minutes is about 153°F .

(c) $100 = 65 + 145 e^{-0.05t} \Leftrightarrow 35 = 145 e^{-0.05t} \Leftrightarrow 0.2414 = e^{-0.05t}$

Thus the temperature will be 100°F in about 28 minutes.