```
> restart;
  with(plots):
```

Maple Worksheet to Accompany Homework Solutions for Section 3.2

Math 242 -- Fall 1994

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Filename: soln3-2.ms

PROBLEM # 1

```
> ode := diff( A(t), t ) = 4-8/100*A(t);
> ic := A(0) = 5;
> dsolve( { ode, ic }, A(t) );
> amt := simplify( rhs(") );
```

But, we need the concentration. This is obtained by dividing the amount by the volume.

```
> conc := amt / 100;
> plot( conc, t=0..10, title=‘Problem #1, Concentration‘ );
> fsolve( conc=0.2, t );
```

That is, the concentration first reaches 0.2 kg/L at t=5.068 minutes.

PROBLEM # 4

```
> ode := diff( A(t), t ) = 4/5 - 3/(100+t)*A(t);
> ic := A(0) = 0;
> dsolve( { ode, ic }, A(t) );
> amt := simplify( rhs(") );
> conc := amt / (100+t);
> plot( conc, t=0..20, title=‘Problem #4, Concentration‘ );
> fsolve( conc=0.1, t, 0..30 );
```

The salt concentration is 0.1 kg/L after 18.9 minutes.

PROBLEM # 7

```
> ode := diff( A(t), t ) = 3/5 - 3/125*A(t);
> ic := A(0) = 0;
> dsolve( { ode, ic }, A(t) );
> amt := simplify( rhs(") );
> conc := amt / 125;
> plot( conc, t=0..30, title=‘Problem #7, Concentration‘ );
> fsolve( conc=0.1, t, 0..30 );
```

The concentration of the drug reaches a level of 0.1 g/cm^3 after only 28.88 seconds.

PROBLEM # 17

```
> ode := diff( F(t), t ) = 2*F(t) - 15;
> ic := F(0) = 7;
> dsolve( { ode, ic }, F(t) );
> fish := rhs(");
> solve( fish=0, t );
> evalf( " );
```

The fish will become extinct in only 1.35 months (just over 16 months).

```
> plot( fish, t=0..2, title=‘Problem #17, Fish (millions of tons)‘ );
```

PROBLEM # 20

```
> ode := diff( DD(t), t ) = -k*Pi*DD(t)^2;
> ic := DD(0) = 4;
> dsolve( { ode, ic }, DD(t) );
> diam := simplify( rhs(") );
```

To find k, use the condition: D(30)=3.

```
> subs( t=30, diam ) = 3;
> solve( ", k );
> subs( k=", diam );
> diam := simplify( " );
```

Now, find the time when the diameter is 2 inches:

```
> solve( diam=2, t );
```

It takes 90 minutes for the diameter to shrink to 2 inches. The following plot will suggest that the diameter is never zero; i.e. the snowball never disappears.

```
> plot( diam, t=0..2000, title=‘Problem #20, Diameter (inches)‘ );
```

END OF WORKSHEET

```
>
```