Find the limit. Use l'Hospital's Rule where appropriate. If there is a more elementary method, consider using it.

$$\lim_{x \to \infty} (e^x + 17x)^{1/x}$$

Need Help? Read It

SCalcET8 6.4.024.

A tank is full of water. Find the work required to pump the water out of the spout. (Use 9.8 m/s^2 for g. Use 1000 kg/m^3 as the density of water. Assume r = 6 m and h = 2 m.)

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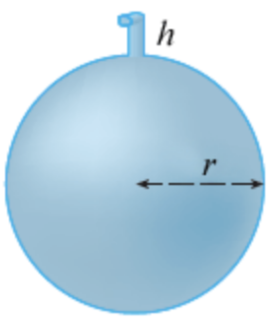

If an object with mass m is dropped from rest, one model for its speed v after t seconds, taking air resistance into account, is

$$v = \frac{mg}{c}(1 - e^{-ct/m}),$$

where g is the acceleration due to gravity and c is a positive constant. (Note that the air resistance is proportional to the velocity of the object; c is the proportionality constant.)

(a) Calculate $\lim_{t \to \infty} v$.

What is the meaning of this limit in the context of this problem?

- ○ It is the speed the object reaches before it starts to slow down.
- ◉ It is the speed the object approaches as time goes on.
- ○ It is the time it takes for the object to stop.
- ○ It is the time it takes the object to reach its maximum speed.

✓

(b) For fixed t, use l'Hospital's Rule to calculate $\lim_{c \to 0^+} v$.

What can you conclude about the velocity of a falling object in a vacuum?

- ○ The heavier the object is the faster it will fall in a vacuum.
- ◉ The velocity of a falling object in a vacuum is directly proportional to the amount of time it falls.
- ○ The velocity of a falling object is proportional to its mass in a vacuum.
- ○ An object falling in a vacuum will accelerate at a slower rate than an object not in a vacuum.

✓

1. SCalcET9 6.5.019.

The linear density ρ in a rod 3 m long is $\dfrac{11}{\sqrt{x+1}}$ kg/m, where x is measured in meters from one end of the rod.

Find the average density ρ_{ave} (in kg/m) of the rod.

ρ_{ave} = ______ kg/m