1. (1 pt) A steel ball weighing 128 pounds is suspended from a spring. This stretches the spring $\frac{128}{325}$ feet.

The ball is started in motion from the equilibrium position with a downward velocity of 5 feet per second.

The air resistance (in pounds) of the moving ball numerically equals 4 times its velocity (in feet per second).

Suppose that after $t$ seconds the ball is $y$ feet below its rest position. Find $y$ in terms of $t$. (Note that this means that the positive direction for $y$ is down.)

$$y = \text{Correct Answers:}$$

- $(0) \ast \{\exp((-1/2 \ast t)) \ast \cos((9 \ast t)) + (5/9) \ast \{\exp((-1/2 \ast t)) \ast \sin((9 \ast t))\}$

2. (1 pt) A hollow steel ball weighing 4 pounds is suspended from a spring. This stretches the spring $\frac{1}{5}$ feet.

The ball is started in motion from the equilibrium position with a downward velocity of 5 feet per second. The air resistance (in pounds) of the moving ball numerically equals 4 times its velocity (in feet per second).

Suppose that after $t$ seconds the ball is $y$ feet below its rest position. Find $y$ in terms of $t$. (Note that the positive direction is down.)

Take as the gravitational acceleration 32 feet per second per second.

$$y = \text{Correct Answers:}$$

- $(0 - 5 \ast \sqrt{6} /48) \ast \exp((-16 - 4 \ast \sqrt{6}) \ast t) + (0 + 5 \ast \sqrt{6} /48) \ast \exp((-16 + 4 \ast \sqrt{6}) \ast t)$

3. (1 pt) This problem is an example of critically damped harmonic motion.

A hollow steel ball weighing 4 pounds is suspended from a spring. This stretches the spring $\frac{1}{8}$ feet.

The ball is started in motion from the equilibrium position with a downward velocity of 6 feet per second. The air resistance (in pounds) of the moving ball numerically equals 4 times its velocity (in feet per second). Suppose that after $t$ seconds the ball is $y$ feet below its rest position. Find $y$ in terms of $t$.

Take as the gravitational acceleration 32 feet per second per second. (Note that the positive $y$ direction is down in this problem.)

$$y = \text{Correct Answers:}$$

- $(0) \ast \exp((-16 \ast t)) + (6) \ast t \ast \exp((-16) \ast t)$

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