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AP CSA 4A
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9/29 - 10/2: R4.1 - R4.5

R4.1

$$s = s_0 + v_0 t + \frac{1}{2} g t^2$$

$$G = 4\pi^2 \frac{a^3}{p^2 \left(m_1 + m_2\right)}$$

$$\mathrm{FV} = \mathrm{PV} \cdot \left(1 + \frac{\mathrm{INT}}{100}\right)^{\mathrm{YRS}}$$

$$c = \sqrt{a^2 + b^2 - 2ab \cos \gamma}$$

1. s = s + (v*t) + (0.5*g*(Math.pow(t, 2)));
2. G = (4*Math.pow(Math.PI, 2)) * ((Math.pow(a, 3))/((Math.pow(p, 2))*(m1+m2)));
3. FV = PV * Math.pow((1 + (INT/100)), YRS);
4. c = sqrt((Math.pow(a, 2))+(Math.pow(b, 2)) - (2*a*b)*Math.cos(x));

R4.2

a.
```
dm = m * (Math.sqrt(1 + v / c) / (Math.sqrt(1
- v / c) - 1));
```

b.
```
volume = Math.PI * r * r * h;
```

c.
```
volume = 4 * Math.PI * Math.pow(r, 3) / 3;
```

d.
```
p = Math.atan2(z, Math.sqrt(x * x + y * y));
```

a. $dm = m \times \frac{\sqrt{1 + (v/c)}}{\sqrt{(1 - (v/c))} - 1}$

b. $volume = \pi \times r \times r \times h$

c. $volume = 4 \times \pi \times r^3/3$

d. $p = z \times \sqrt{x^2 + y^2}$

R4.3

```
x1 = (-b - Math.sqrt(b * b - 4 * a * c)) / 2 * a;
x2 = (-b + Math.sqrt(b * b - 4 * a * c)) / 2 * a;
```

There needs to be a parentheses around the "2 * a". Otherwise, the equation will work from left to right and divide by 2 instead of dividing by 2a.

R4.4

Give an example of integer overflow. Would the same example work correctly if you used floating-point?

```
int i = 1728172;
int j = i * i;
```

The example would work correctly if I used a floating-point because floating points have a much larger range of values that they can handle.

R4.5

Give an example of a floating-point roundoff error. Would the same example work correctly if you used integers and switched to a sufficiently small unit, such as cents instead of dollars, so that the values don't have a fractional part?

```
double i = 6.25;
System.out.println(100*i);
```

Yes, the example would work correctly if you used integers and used a smaller unit. If you did this, you may have to be careful with how large the values may get due to using a smaller unit; an overflow error may occur.