# Warm Up - February 14

**Evaluate each antiderivative.**

1. $\int (5x^3 - \frac{6}{x^2} + 4)\,dx$ (rewrite $\frac{6}{x^2}$ as $6x^{-2}$)

$= \frac{5x^4}{4} - \frac{6x^{-1}}{-1} + 4x + C$

2. $\int \frac{5}{x+1}\,dx$

$= 5\int \frac{1}{x+1}\,dx$

$= 5\ln|x+1| + C$

3. $\int \cos(3x)\,dx$

$= \frac{1}{3}\sin(3x) + C$

4. **Solve the differential equation.**

$\frac{dy}{dx} = \frac{x^2}{y}$ when $y(0) = 5$

$\int y\,dy = \int x^2\,dx$

$\frac{y^2}{2} = \frac{x^3}{3} + C$

$\sqrt{y^2} = \sqrt{\frac{2}{3}x^3 + C}$

$y = \pm\sqrt{\frac{2}{3}x^3 + C}$

$(5)^2 = \left(\sqrt{\frac{2}{3}(0)^3 + C}\right)^2$

$25 = C$

$y = \sqrt{\frac{2}{3}x^3 + 25}$

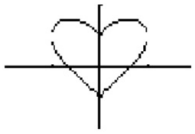
5. **Solve for y, then graph on your calculator.** Window: -2 to 2

$x^2 + \left(y - \sqrt[3]{x^2}\right)^2 = 1$

$\left(y - \sqrt[3]{x^2}\right)^2 = 1 - x^2$

$y - \sqrt[3]{x^2} = \pm\sqrt{1 - x^2}$

$y = \sqrt[3]{x^2} \pm \sqrt{1 - x^2}$

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