33) Several integral expressions are written below. Which ones correspond to the area of the region shown in Figure 6?

I. $\displaystyle\int_{-1}^{1} x^2 - 2\cos\left(\frac{\pi x}{2}\right) - 1 \, \mathrm{d}x$

II. $\displaystyle\int_{-1}^{1} 2\cos\left(\frac{\pi x}{2}\right) - x^2 + 1 \, \mathrm{d}x$

III. $\displaystyle 2\int_{1}^{2} \sqrt{y-1} \, \mathrm{d}y + \frac{4}{\pi}\int_{2}^{4} \arccos\left(\frac{y}{2} - 1\right) \, \mathrm{d}y$

IV. $\displaystyle 2\int_{2}^{4} \sqrt{y-1} \, \mathrm{d}y + \frac{4}{\pi}\int_{1}^{2} \arccos\left(\frac{y}{2} - 1\right) \, \mathrm{d}y$

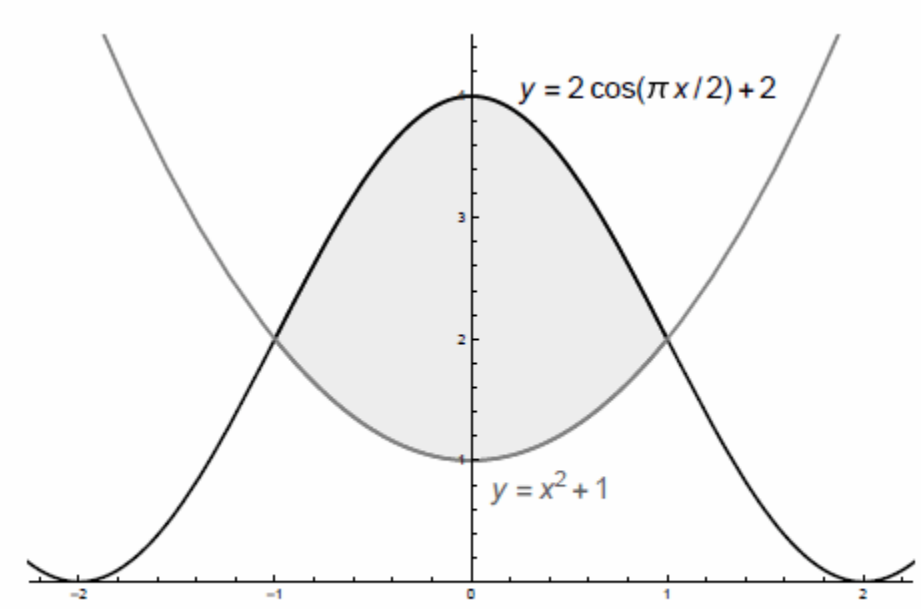

Figure 6

a) I, III and IV only b) I and IV only c) II and III only d) II and IV only e) I and III only

34) The top of a 25 foot ladder is sliding down a wall at a constant rate of 2 feet per minute, but this information is irrelevant to this question. What *is* relevant is the fact that atop this falling ladder stood a mathematician who painted on her wall an antiderivative for the function $(x^2 + 3x + 2)^{-1}$. Which beautiful function did she paint?

a) $\arctan(x+1)$ b) $-\frac{1}{2}(x^2+3x+2)^{-2}$ c) $\ln(x^2+3x+2)^{-2}$ d) $2x+3$ e) $\ln\left|\frac{1+x}{2+x}\right|$

35) Let k denote the number of questions from this test that you answered correctly. The function $f(x) = \dfrac{x\mathrm{e}^x}{k^2+1} + x\mathrm{e}^k$ has a point of inflection when x equals which number?

a) $x = -k$ b) $x = -\mathrm{e}$ c) $x = 0$ d) $x = -2$
e) The function has no points of inflection.