U-Substitution

1. If f is a continuous function and if $F'(x) = f(x)$ for all real numbers x, then $\int_{-1}^{2} f(3x)\,dx =$

   (a) $3F(2) - 3F(-1)$

   (b) $\frac{1}{3}F(2) - \frac{1}{3}F(-1)$

   (c) $F(6) - F(-3)$

   (d) $3F(6) - 3F(-3)$

   (e) $\frac{1}{3}F(6) - \frac{1}{3}F(-3)$

2. If f is a continuous function and if $F'(x) = f(x)$ for all real numbers x, then $\int_{2}^{6} f(4x)\,dx =$

   (a) $4F(6) - 4F(2)$

   (b) $\frac{1}{4}F(6) - \frac{1}{4}F(2)$

   (c) $F(6) - F(2)$

   (d) $4F(24) - 4F(8)$

   (e) $\frac{1}{4}F(24) - \frac{1}{4}F(8)$

3. $\int_{3}^{\cos(\theta)} t^2 \sec(5t^3 + 4)\tan(5t^3 + 4)\,dt =$

4. $\int_{-3}^{1} 2x\sqrt{x^2 + 1}\,dx =$

5. The value of the expression $\int_{0.2}^{0.8} \sin(2x)\,dx$ is equal to the value of which of the following expressions?

I. $\dfrac{1}{2} \int_{0.4}^{1.6} \sin(\theta)\,d\theta$

II. $\Delta x \displaystyle\sum_{k=1}^{N} \sin\left(2(0.2 + k\Delta x)\right)$

III. $\dfrac{1}{2}\left(-\cos(1.6) + \cos(0.4)\right)$

   a. I only
   b. I and III only
   c. III only
   d. II only
   e. I, II, and III

6. $\displaystyle\int (3x - 4)(3x^2 - 8x + 6)^7\,dx =$