CALCULUS I – Worksheet #61

1. $\int \frac{x\,dx}{\sqrt{1+4x^2}}$ = A) $\frac{1}{8}\sqrt{1+4x^2}+C$ B) $\frac{\sqrt{1+4x^2}}{4}+C$ C) $\frac{1}{2}\sin^{-1}2x+C$ D) $\frac{1}{2}\tan^{-1}2x+C$ E) $\frac{1}{8}\ln\sqrt{1+4x^2}+C$

2. $\int \frac{dy}{\sqrt{4-y^2}}$ = A) $\frac{1}{2}\sin^{-1}\frac{y}{2}+C$ B) $-\sqrt{4-y^2}+C$ C) $\sin^{-1}\frac{y}{2}+C$ D) $-\frac{1}{2}\ln\sqrt{4-y^2}+C$ E) $-\frac{1}{3(4-y^2)^{3/2}}+C$

3. $\int \frac{y\,dy}{\sqrt{4-y^2}}$ = A) $\frac{1}{2}\sin^{-1}\frac{y}{2}+C$ B) $-\sqrt{4-y^2}+C$ C) $\sin^{-1}\frac{y}{2}+C$ D) $-\frac{1}{2}\ln\sqrt{4-y^2}+C$ E) $2\sqrt{4-y^2}+C$

4. Find the x–coordinate of the absolute minimum of $f(x) = x^3 - x^2 - x + 1$ on the interval $[-2,2]$. A) -2 B) $-\frac{1}{3}$ C) 0 D) 1 E) 2

5. Given $f(x) = \frac{1}{5}x^5 - \frac{1}{24}x^4$, find where the relative extrema of f " (x) occur.
A) $x = 0, \frac{1}{12}$ B) $x = \frac{1}{8}$ C) $x = \frac{1}{24}$ D) $x = 0, \frac{1}{8}$ E) $0, \frac{1}{6}$

6. A sphere is increasing in volume at the rate of $3p\ \frac{cm^3}{sec}$. At what rate is its radius changing when the radius is $\frac{1}{2}$ cm? A) p cm/sec B) 3 cm/sec C) 2 cm/sec D) 1 cm/sec E) $\frac{1}{2}$ cm/sec

7. (Free Response) Let area A be the region bounded by $y = 2^x - 1$, $y = -2x + 3$, and the y–axis.
   a) Find an exact value for the area of region A.
   b) *Set up,* but do NOT integrate, an integral expression in terms of a single variable for the volume of the solid generated when A is revolved around the x–axis.
   c) Set up an integral expression in terms of a single variable for the volume of the solid generated when A is revolved around the y–axis. Find an approximation for this volume correct to the nearest thousandth.