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1. Find the integral  $\int_0^{\pi} \sin \frac{x}{4} \cos \frac{x}{4} dx$ . Show work. Encircle correct answer:

- a) 0   b) 1   c) 2   d)  $\sqrt{2}/2$    e)  $-\sqrt{2}/2$    f) none of the previous.

2. Evaluate  $\int_{-1}^2 \frac{t dt}{\sqrt{2t^2 + 8}}$ . Show work. Encircle correct answer:

- a) 2   b)  $\sqrt{5}/2$    c)  $2 - \sqrt{5}/2$    d)  $2 + \sqrt{2}/2$    e)  $2 + \sqrt{5}/2$    f) none of the previous.

3. Find the average value of the function  $f(x) = 3x^2\sqrt{x^3 + 1}$  on the interval  $[-1, 1]$ . Show work. Encircle correct answer:

- a)  $2\sqrt{2}/3$    b)  $2\sqrt{5}/3$    c)  $2 - \sqrt{5}/2$    d)  $2 + \sqrt{2}/2$    e)  $2 + \sqrt{5}/2$    f) none of the previous.

4. Let  $f(x) = \int_0^{\cos x} \sqrt{1 + t^3} dt$ . Find  $f'(x)$ . Show work. Encircle correct answer:

- a)  $\sqrt{1 + \cos^3 x}$    b)  $\sqrt{1 + \cos^3 t}$    c)  $(3/2)\sqrt{1 + \cos^3 x}$    d)  $-\sin x \sqrt{1 + \cos^3 x}$    e)  $2 + \sqrt{1 + \cos^3 x}/2$   
f) none of the previous.

5. Sketch the region bounded by the graphs of  $x = y^2$  and  $x = y + 2$ . Then calculate the area of the region. Show work.

Answer =
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6. Find the trapezoidal sum approximation to  $\int_0^{\pi/2} \cos x dx$  using a partition of 3 equally spaced subintervals. Show work. Encircle correct answer:

- a)  $2 + \sqrt{3}$    b)  $(\sqrt{5}/2)(\pi/12)$    c)  $(\pi/12)(2 + \sqrt{5/3})$    d)  $(\pi/12)(2 + \sqrt{3}/2)$    e)  $(\pi/12)(2 + \sqrt{3})$   
f) none of the previous.

7. State

- (a) The Fundamental Theorem of Calculus  
(b) The Mean Value Theorem for Definite Integrals