MATH 1210____ Practice exam 3

WARNING: BY NO MEANS ASSUME THAT ACTUAL TEST MUST HAVE SIMILAR PROBLEMS. THE SAMPLE TEST REFLECTS EXPECTED TOPICS ONLY!!!

1. (Section 4.2) Evaluate the integral $\int_a^b f(x)dx$, on the given interval $[a,b]$, by interpreting it in terms of areas.
(a) (10 points) $f(x) = \sqrt{4-x^2}$, $[-2,2]$.
(b) (8 points) $f(x) = 2x-1$, $[0,2]$.

2. (Section 4.3) Find the derivative of the function $\frac{dy}{dx}$.
(a) (10 points) $y = \int_1^{\sin x} \sqrt{1+t^2}\, dt$.
(b) (10 points) $y = \int_x^1 \tan(t^4)dt$.
(c) (8 points) $y = \int_{-3}^{x} \frac{t}{2+t^4} dt$.

3. (Sections 4.3) Evaluate the integral.
(a) (10 points) $\int \frac{x^2 - 2\sqrt{x} + x}{x} dx$.
(b) (8 points) $\int (2\sqrt{x} - x)(3x^2+1)dx$.

4. (Section 4.4) A particle moves along a line so that its velocity at time t is $v(t) = t^2 - 2t - 8$ (measured in meters per second). Find
(a) (10 points) The distance travelled by the particle during $2 \le t \le 5$.
(b) (8 points) The displacement of the particle during $2 \le t \le 5$.

5. (Sections 4.5) Evaluate the integral.
(a) (10 points) $\int_0^{\sqrt[3]{\pi/4}} x^2 \cos(x^3)dx$.
(b) (8 points) $\int \sin^3 x \cos x dx$.

6. (Sections 4.5) Evaluate the integral.
(a) (10 points) $\int x \sec^2(x^2)dx$.
(b) (8 points) $\int \sqrt{2x-1}\, dx$.

7 (Section 4.5) Evaluate the integral.
(a) (10 points) $\int_{-\pi/2}^{\pi/2} \frac{x^2 \sin x}{1+x^6} dx$.
(b) (8 points) $\int_{-1}^{1} \frac{x^3}{1+x^6} dx$.

8. (Section 5.1) Find the area of the region bounded by the given curves.

(a) (10 points) $y = 3x - x^2,\ y = x.$

(b) (8 points) $y = \sqrt{x},\ y = x,\ x = 2,\ x = 4.$

9. (Sections 5.2)

(a) (10 points) Find the volume of the solids obtained by rotating the region bounded by the curves $y = x^2$ and $y = \sqrt{x}$ about $y = 1$ axis.

(b) (8 points) Find the volume of the solids obtained by rotating the region bounded by the curves $y = x^2,\ y = 0,$ and $x = 1$ about x –axis.

10. (Chapters 4 and 5) True or False:

( ) If f is continuous and defined on $[1,2]$, then $(\int_1^{x^2} f(t)dt)' = f(x^2)$ for all x in $[1,2]$.

( ) $(\int_0^{\pi/5} \sin^4 x dx)' = 0.$

( ) If f is continuous on $[a,b]$, then $\int f(x)dx = F(b) - F(a)$, where F is an antiderivative of f.

( ) $\lim_{n\to\infty} \sum_{k=1}^{n} \frac{x_k}{1+x_k^4} \Delta x = \int_0^1 \frac{x}{1+x^4} dx$, where $x_k,\ k = 1,2,\ldots n,$ are equally spaced points on the interval $[0,1]$.

( ) If f and g are continuous on $[a,b]$, then $\int_a^b (f(x) + g(x))dx = \int_a^b f(x)dx + \int_a^b g(x)dx.$