MATH 220   **Test 3**   **August 4, Summer 2015**

Name _____   **NetID** _____

- Do not open this test booklet until I say *START*.

- Turn off all electronic devices and put away all items except a pen/pencil and an eraser.

- Remove hats and sunglasses.

- You must show sufficient work to justify each answer.

- While the test is in progress, we will not answer questions concerning the test material.

- Quit working and close this test booklet when I say *STOP*.

- Quickly turn in your test to me and show your Student ID.

1	2	3	4	5	6	7	8	9	10	11	$\sum$
5	5	10	10	10	10	10	10	10	10	10	100

1. (5 points)Fill in the missing information to show that the area between the x-axis and the graph of $f(x) = x^2 - 5$ on the interval $[1, 6]$ can be expressed as the limit of a right Riemann sum. The only variables appearing in your limit should be n and k. Do not evaluate this limit.

$$AREA = \lim_{n\to\infty} \sum_{k=1}^{n} \left[\right]$$

2. (5 points) You are given the following definite integrals of an odd function $f(x)$.

$$\int_0^9 f(x)\,dx = 22$$

$$\int_3^9 f(x)\,dx = 16$$

Evaluate the following definite integrals.

(a) $\displaystyle\int_9^9 f(x)^5\,dx$

(b) $\displaystyle\int_{-3}^9 (f(x) + 5)\,dx$

3. (10 points) Determine the formula for a function $f(x)$ such that $f'(x) = 6e^{2x} + \cos x,\ f(0) = 6$.

4. (10 points) Evaluate the definite integral. Simplify your answer.

$$\int_0^1 \frac{3x^2}{x^3 + 1}\, dx$$

5. (10 points) Evaluate the following indefinite integrals.

(a) $\int \sin x \, dx$

(b) $\int \cos x \, dx$

(c) $\int e^x \, dx$

(d) $\int \frac{1}{x} \, dx$

(e) $\int \sec^2 x \, dx$

(f) $\int \csc^2 x \, dx$

(g) $\int \csc x \cot x \, dx$

(h) $\int \sec x \tan x \, dx$

(i) $\int \frac{1}{1 + x^2} \, dx$

(j) $\int \frac{1}{\sqrt{1 - x^2}} \, dx$

6. (10 points) Evaluate the indefinite integral.

$$\int \tan x \sec^3 x \, dx$$

7. (10 points) Evaluate the indefinite integral.

$$\int \frac{\cos^4 x}{\csc x \sec^3 x} \, dx$$

8. (10 points) Evaluate the indefinite integral.

$$\int \frac{6x^2 + 2}{x^2 + 1} \, dx$$

9. (10 points) Let $g(x) = \int_{(x+4)^3}^{150} \cos\left(t^2 + 9\right) dt$. Determine $g'(x)$.

10. (10 points) Water flows from the bottom of a storage tank at a rate of $r(t) = 150 - 5t$ liters per minute, where $0 \le t \le 60$. Find the amount of water that flows from the tank during the first 20 minutes.(Take the initial amount of flowing water as 0)

11. (10 points) Let R be the finite region bounded by the graphs of $x = 4y$ and $y^2 = 4x$. These curves intersect at the origin and the point (x,y)=(64,16). Revolve R around the horizontal line y=20 to form a solid. in the following manner, set up but do not evaluate definite integrals which represent the volume of the solid. Use proper notation.

(a) Integrate with respect to x.

(b) Integrate with respect to y.