Name _____ Rec. Instr._____
Signature _____ Rec. Time_____

Math 220
Exam 3
November 15, 2018

No books, calculators, or notes are allowed. Please make sure that your cell phone is turned off. You will have 75 minutes to complete the exam. Unless instructed otherwise, **show your work** on each problem.

Problem	Points	Points Possible	Problem	Points	Points Possible
1		25	5		10
2		12	6		8
3		10	7		14
4		10	8		11

Total Score	

1. (5 points each) Evaluate the following:

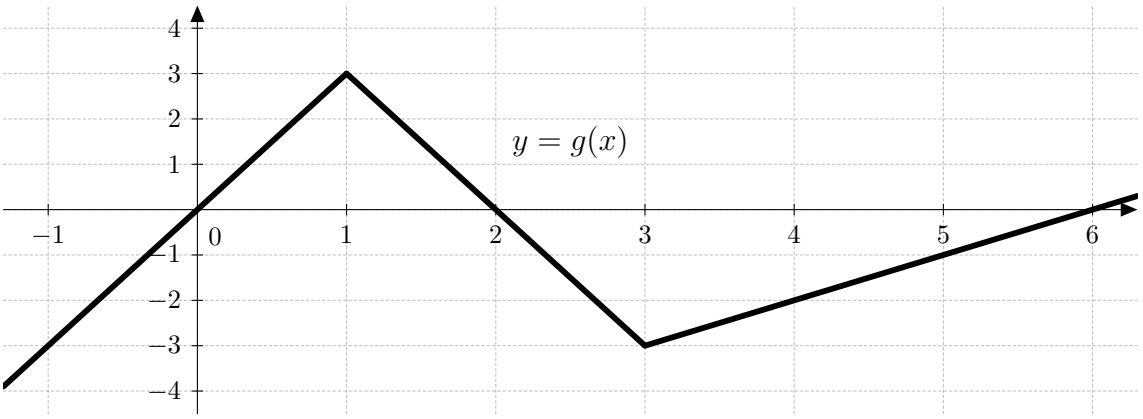
A. $\lim_{\theta \to 0} \dfrac{\sin(\theta^2)}{\theta^2} =$

B. $\lim_{x \to \infty} \dfrac{x \ln(x)}{x^2 + 3x} =$

C. $\displaystyle\int \left(\sqrt{x} + 6\sec^2(x) - 5\right)\, dx =$

D. $\dfrac{d}{dx} \displaystyle\int_3^x e^{2t} \sin(t^3)\, dt =$

E. $\displaystyle\int_0^4 (e^x - 3)\, dx \;\; =$



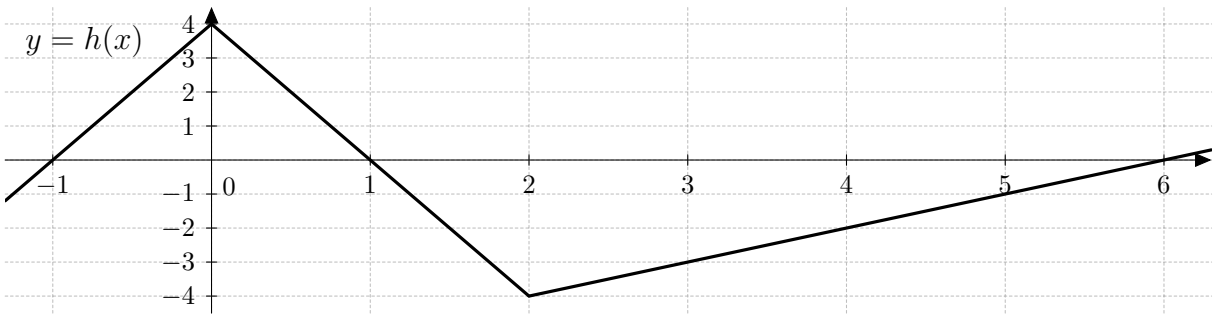
2. (4 points each) $y = g(x)$ is plotted above. Let $A(x) = \int_0^x g(t)\,dt$. Find the following quantities.

A. $\int_2^6 g(x)\,dx =$

B. $\int_1^0 g(x)\,dx =$

C. $A'(4) =$

3. (10 points) Find $f(x)$ if $f''(x) = 6x$, $f'(0) = 1$, and $f(0) = 2$.



4. (10 points) Estimate $\int_0^6 h(x)\,dx$ by computing L_3, the Left-Endpoint Approximation with 3 subintervals. Also, illustrate the rectangles on the graph above.

5. Let $w(t) = 4 - t/2$ for $0 \le t \le 8$ be the rate that water flows out of a storage tank in gallons per minute at time t minutes after the tank ruptures.

A. (7 points) Find $\int_2^4 w(t)\,dt$. (Include units with your answer.)

B. (3 points) What does $\int_2^4 w(t)\,dt$ represent?

6. (8 points) Suppose that a particle has position $s(t)$ feet at time t seconds and a velocity function $s'(t) = 3\cos(t)$ ft/s. Find the displacement (change in position) from time $t = 0$ seconds to time $t = \pi/2$ seconds. (Include units with your answer.)

7. (7 points each) Evaluate the following:

A. $\displaystyle\int_0^{\pi/2} 2\sin^3(\theta)\cos(\theta)\,d\theta =$

B. $\displaystyle\int x\sqrt{5+x}\,dx =$

8. (11 points) A rectangular open-topped aquarium is to have a square base and volume 8 m^3. The material for the base costs \$2 per m^2, and the material for the sides costs \$1 per m^2. What dimensions minimize the cost of the aquarium? (Make sure to justify why your answer corresponds to an absolute minimum. Include units with your answer.)