

Name _____ Rec. Instr. _____
Signature _____ Rec. Time _____

Math 220
Exam 3
November 17, 2016

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.
Show your work.

Problem	Points	Points Possible	Problem	Points	Points Possible
1		18	6		6
2		18	7		6
3		10	8		8
4		8	9		6
5		10	10		10

Total Score:

1. Evaluate the following integrals.

A. (6 points) $\int \frac{x^2 - 7x}{x^3} dx$

B. (6 points) $\int \sqrt{\tan x} \sec^2 x dx$

C. (6 points) $\int \frac{(\ln x)^3}{x} dx$

2. Evaluate the following limits.

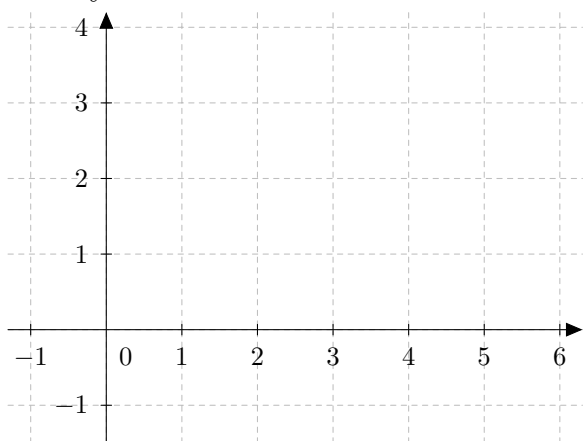
A. (6 points) $\lim_{t \rightarrow 0} \frac{4t - \sin(2t)}{5t^2 + 3t}$

B. (6 points) $\lim_{x \rightarrow \infty} x \sin \left(\frac{2}{x} \right)$

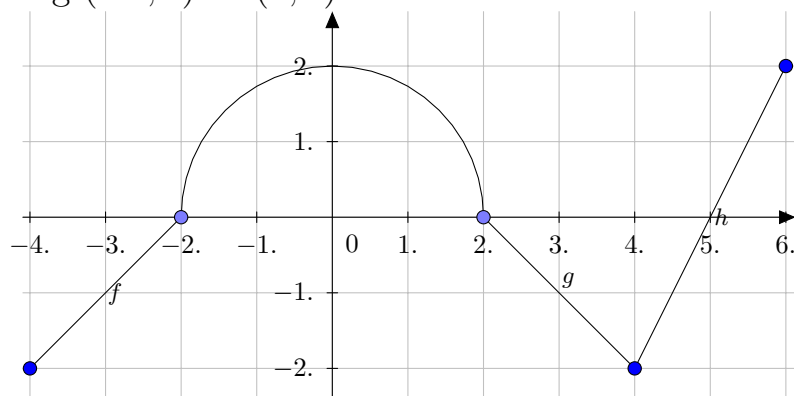
C. (6 points) $\lim_{x \rightarrow \infty} (5x)^{1/x}$

3. (10 points) A rectangular fence consists of three sides costing \$2 per meter, and one side costing \$1 per meter. If the area of the rectangle is 12 square meters, find the dimensions that minimize the cost of the fence.

4. (8 points) Estimate the area below the curve $y = \sqrt{x} + 1$ over the interval $[0, 6]$ using R_3 , the right end point approximation with three intervals. Also, make a sketch of the graph of $y = \sqrt{x} + 1$ and illustrate the rectangles on your graph. (Leave your answer as a sum. Do not simplify. $\sqrt{2} \approx 1.41$, $\sqrt{6} \approx 2.45$.)



5. For the function $f(x)$ graphed below evaluate the given integrals. The arc joining $(-2, 0)$ to $(2, 0)$ is a semicircle.



A. (5 points) $\int_{-2}^2 f(x) \, dx$

B. (5 points) $\int_{-2}^6 f(x) \, dx$

6. (6 points) Evaluate the following integral. Use principles of symmetry.

$$\int_{-2}^2 \frac{\sin x}{1+x^2} + \cos\left(\frac{\pi}{4}x\right) \, dx$$

7. (6 points) Find the average value of $f(x) = \sqrt{x}$ over the interval $[0, 4]$.

8. (8 points) Solve the initial value problem for $f(t) : f'(t) = 4e^{3t}, f(0) = 5$.

9. (3 points) **A.** Find $\frac{d}{dx} \int_2^x \frac{\sin t}{1+t} dt$

(3 points) **B.** Find $\frac{d}{dx} \int_2^{x^3} \frac{\sin t}{1+t} dt$

10. An object moves along a straight line with velocity $v(t) = 4 - t^2$, m/sec.

A. (5 points) Find the displacement of the object over the time interval $[0, 3]$ seconds.

B. (5 points) Find the total distance the object travels over the time interval $[0, 3]$ seconds.