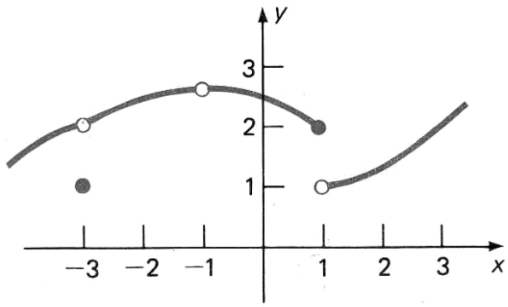
Math 150 Practice Final Exam
NAME: ______________________________

Problems from Exam I

Problem 1: For the function f graphed below find the indicated limit or function value, or state that it does not exist



A) $\lim_{x \to -3} f(x)$ B) $\lim_{x \to -1} f(x)$ C) $f(-1)$ D) $f(3)$

Problem 2: Find the limit $\lim_{x \to 2} \frac{7x^5 - 10x^4 - 13x + 6}{3x^2 - 6x - 8}$

Problem 3: Find the limit $\lim_{x \to 1} \frac{x^3 + 3x + 7}{x^2 - 2x + 1}$

Problem 4: Find the limit $\lim_{t \to 2} \frac{t^2 + 3t - 10}{t^2 + t - 6}$

Problem 5: Find the limit $\lim_{x \to 4} \frac{x - 4}{\sqrt{x} - 2}$

Problem 6: Prove that $\lim_{x \to 2} \frac{2x^2 - 3x - 2}{x - 2} = 5$

Problem 7: Differentiate $f(x) = \frac{x}{x-1}$ by using the definition of the derivative.

Problem 8: Differentiate $f(x) = \sqrt{x}$ by using the definition of the derivative.

Problem 9: Does $y = x^4 - 2x^2 + 2$ have any horizontal tangents? If so, where?

Problem 10: Find the derivative of

A) $y = \frac{t^2 - 1}{t^2 + 1}$ B) $y = \frac{(x-1)(x^2 - 2x)}{x^4}$ C) $r = \frac{12}{\theta} - \frac{4}{\theta^3} + \frac{1}{\theta^4}$ D) $y = \frac{\cos x}{1 + \sin x}$

E) $y = \csc x - 4\sqrt{x} + 7$ F) $s(t) = t^2 - \sec t + 1$ G) $p(q) = \frac{\tan q}{1 + \tan q}$

Problem 11: Find the equation for the line that is tangent to the curve $y = x^3 - x$ at the point (-1, 0)

Problem 12: A dynamite blast blows a heavy rock straight up with a launch velocity of 160ft/sec (about 109 mph). It reaches a height of s(t) = 160t – 16t^2 ft after $\boldsymbol{t}$ sec.

A) How high does the rock go?

B) What is the velocity and speed of the rock when it is 256 ft above the ground on the way up? On the way down?

C) What is the acceleration of the rock at any time t during its flight (after the blast)?

D) When does the rock hit the ground?

Problems from Exam II

Problem 1: Find the limit $\lim_{x\to\infty}\sqrt{x}\sin\frac{1}{x}$

Problem 2: Find the limit $\lim_{x\to\infty}\sqrt{\frac{12x^3-5x+2}{1+4x^2+3x^3}}$

Problem 3: Given $f(x)=\cos^2 x-2\sin x,\ 0\le x\le 2\pi$

A) Find the interval on which *f* is increasing or decreasing.

B) Find the local maximum and minimum values of *f*.

C) Find the interval of concavity and the inflection points.

Problem 4: Graph the function *f* having the given characteristics.

$$f(2)=f(4)=0$$
$$f'(x)>0 \text{ if } x<3$$
$$f'(3) \text{ is undefined}$$
$$f'(x)<0 \text{ if } x>3$$
$$f''(x)>0, x\ne 3$$

Problem 5: Find the value or values of *c* that satisfy the equation $f'(c)=\frac{f(b)-f(a)}{b-a}$ in the conclusion of the Mean Value Theorem for the function $f(x)=\frac{x}{x+2}$ and interval [1, 4].

Problem 6: Find the absolute maximum and absolute minimum values of $f(t)=t+\cot(t/2),\ \left[\frac{\pi}{4},\frac{7\pi}{4}\right]$

Problem 7: If $z^2=x^2+y^2, \frac{dx}{dt}=2$ and $\frac{dy}{dt}=3,$ find $\frac{dz}{dt}$ when x = 5 and y = 12.

Problem 8: Use implicit differentiation to find an equation of the tangent line to the curve $x^2+2xy-y^2+x=2$ at (1, 2).

Problem 9: Find an equation of the tangent line to the curve $y=\sin(\sin x)$ at $(\pi,0)$.

Problem 10: Find the limit $\lim_{x\to 1}\frac{\sin(x-1)}{x^2+x-2}$

Problem 11: The radius r of a circle is increasing at a rate of 3 inches per minute. Find the rates of change of the area when

A) r = 6 inches

B) r = 24

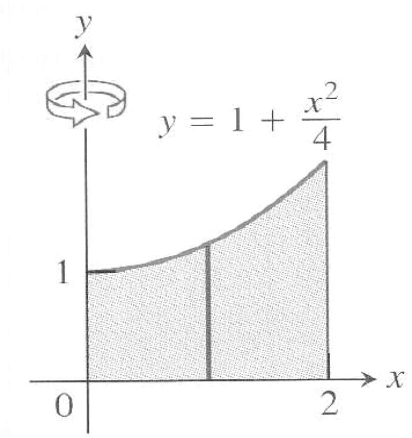
Problem 12: Find $\lim_{x\to 0}\sec\left[\cos x+\pi\tan\left(\frac{\pi}{4\sec x}\right)-1\right]$

Problems from Exam III

Math 150 **Practice Exam 3A**

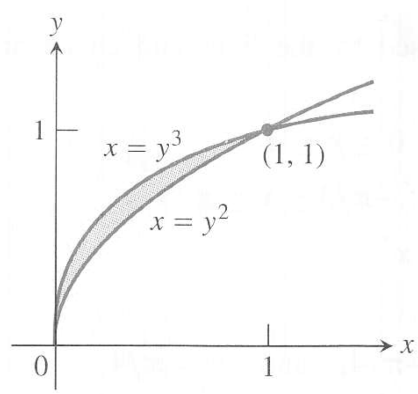
NAME: ____________________________

Problem 1: The region bounded by the curve $y = 1 + \frac{x^2}{4}$ the x-axis, and the line x = 2 is revolved about the y-axis to generate a solid. Use the shell method to find the volume of the solid.



Problem 2: Use the washer method to find the volume of the solid generated when the region bounded by the line $y = x$, y = 1 and x = 0 is revolved about the x-axis.

Problem 3: Find the area of the shaded region.



Problem 4: Evaluate the integral $\int_0^2 x(2 + x^5)\,dx$

Problem 5: Find the general indefinite integral $\int v(v^2 + 2)^2\,dv$

Problem 6: 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).

A) Find the displacement of the particle during the time period $0 \le t \le 6$.

B) Find the distance traveled during this time period.

Problem 7: Evaluate the indefinite integral. $\int (x+1)\sqrt{2x + x^2}\,dx$

Problem 8: Evaluate the indefinite integral. $\int_0^{\sqrt{\pi}} x\cos(x^2)\,dx$

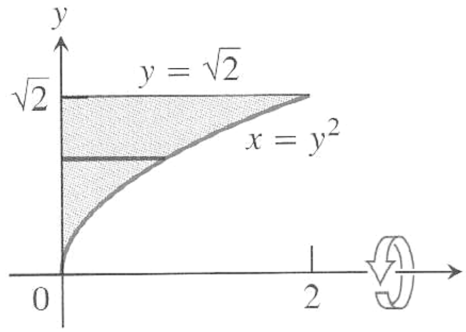
Problem 9: Find f(x) given that $f'(x) = 2x - 7$ *and* $f(2) = 0$

Problem 10: Find f(x) given that $f''(x) = 2 - 6x$, $f'(0) = 4$ *and* $f(0) = 1$

Math 150 **Practice Exam 3B**

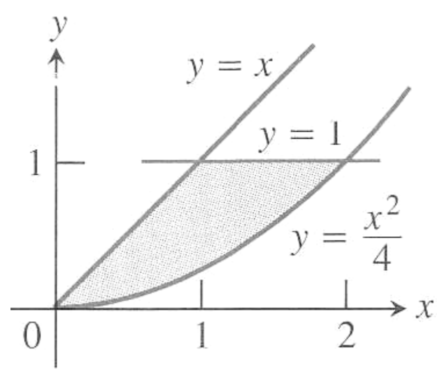
NAME: ______________________________

Problem 1: The region bounded by the curve $x = y^2$ the y-axis, and the line $y = \sqrt{2}$ is revolved about the x-axis to generate a solid. Use the shell method to find the volume of the solid.



Problem 2: Use the washer method to find the volume of the solid generated when the region bounded by the curve $y = 2\sqrt{x}$ and the lines $y = 2$ and x = 0 is revolved about x-axis.

Problem 3: Find the area of the shaded region.



Problem 4: Evaluate the integral $\int_1^9 \frac{x-1}{\sqrt{x}}dx$

Problem 5: Find the general indefinite integral $\int \sec t(\sec t + \tan t)dt$

Problem 6: A particle moves along a line so that its velocity at time t is $v(t) = 3t - 5$ (measured in meters per second).

A) Find the displacement of the particle during the time period $0 \le t \le 3$.

B) Find the distance traveled during this time period.

Problem 7: Evaluate the indefinite integral. $\int \sin \pi t\, dt$

Problem 8: Evaluate the indefinite integral. $\int_0^1 x^2(1+2x^3)^5 dx$

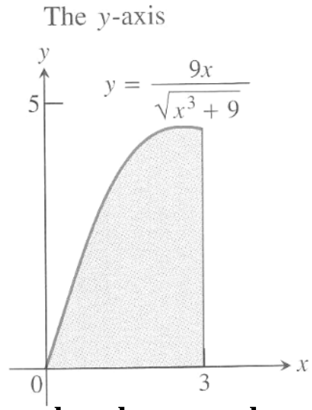
Problem 9: Find f(x) given that $f''(x) = 24x^2 + 2x + 10$ *and* $f(1) = 5, f'(1) = -3$

Problem 10: Find f(x) given that $f''(x) = 2 - 12x,\ f(0) = 9$ *and* $f(2) = 15$

Math 150 **Practice Exam 3C**

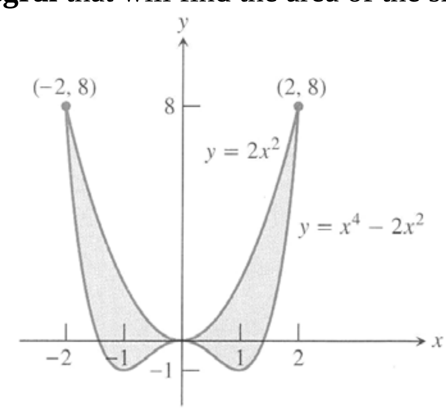
NAME: ______________________________

Problem 1: The region bounded by the curve $y = \dfrac{9x}{\sqrt{x^3+9}}$, the y-axis, and the line $x = 3$ is revolved about the y-axis to generate a solid. Use the shell method to **set up, but do not evaluate the integral** that would find the volume of the solid.



Problem 2: Use the washer method to **set up, but do not evaluate the integral** that will find the volume of the solid generated when the region bounded by the curve $y^2 = x$ and the lines $x = 2$ and y = 0 is revolved about the y-axis.

Problem 3: **Set up but do not evaluate the integral** that will find the area of the shaded region.



Problem 4: Evaluate the integral $\int_1^2 (1+2y)^2\,dy$

Problem 5: Find the general indefinite integral $\int \dfrac{\sin 2x}{\sin x}\,dx$

Problem 6: A particle moves along a line so that its velocity at time t is $v(t) = 2t + 2$ (measured in meters per second).

A) Find the displacement of the particle during the time period $-2 \le t \le 1$.

B) Find the distance traveled during this time period.

Problem 7: Evaluate the indefinite integral. $\int \dfrac{\cos\sqrt{t}}{\sqrt{t}}\,dt$

Problem 8: Evaluate the definite integral. $\int_0^7 \sqrt{4+3x}\,dx$

Problem 9: Find f(x) given that $f''(\theta) = \sin\theta + \cos\theta \quad f(0) = 3,\ f'(0) = 4$

Problem 10: Find f(x) given that $f''(x) = 2 + \cos x,\ f(0) = -1 \ \ and\ \ f\left(\dfrac{\pi}{2}\right) = 0$