Name: _____

Instructor: _____

Math 10560, Practice Exam 1.
February 14, 2012

- The Honor Code is in effect for this examination. All work is to be your own.
- No calculators.
- The exam lasts for 1 hour and 15 min.
- Be sure that your name is on every page in case pages become detached.
- Be sure that you have all 10 pages of the test.

PLEASE MARK YOUR ANSWERS WITH AN X, not a circle!

1.	(a)	(b)	(c)	(d)	(e)
2.	(a)	(b)	(c)	(d)	(e)
3.	(a)	(b)	(c)	(d)	(e)
4.	(a)	(b)	(c)	(d)	(e)
5.	(a)	(b)	(c)	(d)	(e)
6.	(a)	(b)	(c)	(d)	(e)
7.	(a)	(b)	(c)	(d)	(e)
8.	(a)	(b)	(c)	(d)	(e)

Please do NOT write in this box.

Multiple Choice	_____
9.	_____
10.	_____
11.	_____
12.	_____
Total	_____

Name: _____

Instructor: _____

Multiple Choice

1.(7 pts.) Simplify the following expression for x.

$$x = \log_3 81 + \log_3 \frac{1}{9} \ .$$

(a) $x = 9$ (b) $x = 6$ (c) $x = \ln 9 - \ln 3$

(d) $x = \ln 3$ (e) $x = 2$

2.(7 pts.) The function $f(x) = x^3 + 3x + e^{2x}$ is one-to-one. Compute $(f^{-1})'(1)$.

(a) 0 (b) $\frac{1}{5}$ (c) $\frac{1}{4}$ (d) $\frac{1}{6+e}$ (e) $\frac{1}{6+2e}$

Name: _____

Instructor: _____

3.(7 pts.) Differentiate the function

$$f(x) = \frac{(x^2-1)^4}{\sqrt{x^2+1}}.$$

(a) $f'(x) = \dfrac{x(x^2-1)^4}{\sqrt{x^2+1}}\left(\dfrac{8}{x^2-1} + \dfrac{1}{x^2+1}\right)$

(b) $f'(x) = \dfrac{(x^2-1)^4}{\sqrt{x^2+1}}\left(\dfrac{4}{x^2-1} - \dfrac{1}{x^2+1}\right)$

(c) $f'(x) = \dfrac{(x^2-1)^4}{\sqrt{x^2+1}}\left(\dfrac{4}{x^2-1} + \dfrac{1}{x^2+1}\right)$

(d) $f'(x) = \dfrac{(x^2-1)^4}{\sqrt{x^2+1}}\left(\dfrac{8}{x^2-1} - \dfrac{1}{x^2+1}\right)$

(e) $f'(x) = \dfrac{x(x^2-1)^4}{\sqrt{x^2+1}}\left(\dfrac{8}{x^2-1} - \dfrac{1}{x^2+1}\right)$

4.(7 pts.) Compute the integral

$$\int_{2e}^{2e^2} \frac{1}{x(\ln \frac{x}{2})^2} dx.$$

(a) 2 (b) $\dfrac{3}{2}$ (c) $\dfrac{1}{2}$ (d) 1 (e) 0

Name: _____

Instructor: _____

5.(7 pts.) Which of the following expressions gives the partial fraction decomposition of the function

$$f(x) = \frac{x^2 - 2x + 6}{x^3(x-3)(x^2+4)}?$$

(a) $\dfrac{A}{x^3} + \dfrac{B}{x-3} + \dfrac{C}{x^2+4}$

(b) $\dfrac{A}{x^3} + \dfrac{B}{x-3} + \dfrac{Cx+D}{x^2+4}$

(c) $\dfrac{A}{x^3} + \dfrac{B}{x^2} + \dfrac{C}{x} + \dfrac{D}{x-3} + \dfrac{E}{x^2+4}$

(d) $\dfrac{A}{x^3} + \dfrac{B}{x^2} + \dfrac{C}{x} + \dfrac{D}{x-3} + \dfrac{Ex+F}{x^2+4}$

(e) $\dfrac{A}{x^3} + \dfrac{B}{x^2} + \dfrac{C}{x} + \dfrac{D}{x-3} + \dfrac{E}{x+2} + \dfrac{F}{x-2}$

6.(7 pts.) Find $f'(x)$ if

$$f(x) = x^{\ln x} \ .$$

(a) $2(\ln x)x^{\ln x}$

(b) $x^{\ln x} \ln x$

(c) $2(\ln x)x^{(\ln x)-1}$

(d) $x^{\ln x}(\ln x + 1)$

(e) $x^{(\ln x)-1} \ln x$

Name: _____

Instructor: _____

7.(7 pts.) Calculate the following integral.

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

(a) $\frac{1}{2}$ (b) $\frac{\pi}{8}$ (c) $\frac{\pi^2}{32}$ (d) $\ln 2$ (e) $\frac{\pi^2}{8}$

8.(7 pts.) Evaluate the integral

$$\int_0^{\pi/2} \sin^3(x)\cos^5(x)dx.$$

(a) 0 (b) $\frac{\pi}{2}$ (c) $-\frac{1}{24}$ (d) $\frac{1}{24}$ (e) $\frac{1}{4}$

Name: _____

Instructor: _____

Partial Credit

You must show your work on the partial credit problems to receive credit!

9.(11 pts.) Compute the limit

$$\lim_{x\to 2}\left(\frac{x}{2}\right)^{\dfrac{1}{x-2}}.$$

Name: _____

Instructor: _____

10.(11 pts.) Evaluate the integral

$$\int x^2 \cos(2x) dx.$$

Name: _____

Instructor: _____

11.(11 pts.) Evaluate:

$$\int \frac{1}{3} x^3 \sqrt{9 - x^2}\, dx.$$

Name: _____

Instructor: _____

12.(11 pts.) Let $C(t)$ be the concentration of a drug in the bloodstream. As the body eliminates the drug, $C(t)$ decreases at a rate that is proportional to the amount of the drug that is present at the time. Thus $C'(t) = kC(t)$, where k is a constant. The initial concentration of the drug is 4 mg/ml. After 5 hours, the concentration is 3 mg/ml.

(a) Give a formula for the concentration of the drug at time t.

(b) How much drug will there be in 10 hours?

(c) How long will it take for the concentration to drop to 0.5 mg/ml?

Name: _____

Instructor: _____

The following is the list of useful trigonometric formulas:

$$\sin^2 x + \cos^2 x = 1$$

$$1 + \tan^2 x = \sec^2 x$$

$$\sin^2 x = \frac{1}{2}(1 - \cos 2x)$$

$$\cos^2 x = \frac{1}{2}(1 + \cos 2x)$$

$$\sin 2x = 2 \sin x \cos x$$

$$\sin x \cos y = \frac{1}{2}\big(\sin(x - y) + \sin(x + y)\big)$$

$$\sin x \sin y = \frac{1}{2}\big(\cos(x - y) - \cos(x + y)\big)$$

$$\cos x \cos y = \frac{1}{2}\big(\cos(x - y) + \cos(x + y)\big)$$

The hyperbolic sine and cosine functions are defined to be:

$$\cosh x = \frac{e^x + e^{-x}}{2}$$

$$\sinh x = \frac{e^x - e^{-x}}{2}$$

Name: _____

Instructor: ANSWERS

Math 10560, Practice Exam 1.
February 14, 2012

- The Honor Code is in effect for this examination. All work is to be your own.
- No calculators.
- The exam lasts for 1 hour and 15 min.
- Be sure that your name is on every page in case pages become detached.
- Be sure that you have all 10 pages of the test.

PLEASE MARK YOUR ANSWERS WITH AN X, not a circle!

1.	(a)	(b)	(c)	(d)	(•)
2.	(a)	(•)	(c)	(d)	(e)
3.	(a)	(b)	(c)	(d)	(•)
4.	(a)	(b)	(•)	(d)	(e)
5.	(a)	(b)	(c)	(•)	(e)
6.	(a)	(b)	(•)	(d)	(e)
7.	(a)	(b)	(•)	(d)	(e)
8.	(a)	(b)	(c)	(•)	(e)

Please do NOT write in this box.

Multiple Choice	_____
9.	_____
10.	_____
11.	_____
12.	_____
Total	_____

Name: _____

Instructor: _____

Math 10560, Exam 1
February 17, 2015

- The Honor Code is in effect for this examination. All work is to be your own.
- No calculators.
- The exam lasts for 1 hour and 15 min.
- Be sure that your name is on every page in case pages become detached.
- Be sure that you have all 4 pages of the test.

PLEASE MARK YOUR ANSWERS WITH AN X, not a circle!

Please do NOT write in this box.

Multiple Choice	_____
2.	_____
3.	_____
Total	_____

Name: _____

Instructor: _____

Multiple Choice

1.(6 pts) Which of the following expressions gives the partial fraction decomposition of the function

$$f(x) = \frac{x^2 - 2x + 6}{x^3(x-3)(x^2+4)}?$$

(a) $\dfrac{A}{x^3} + \dfrac{B}{x^2} + \dfrac{C}{x} + \dfrac{D}{x-3} + \dfrac{Ex+F}{x^2+4}$

(b) $\dfrac{A}{x^3} + \dfrac{B}{x-3} + \dfrac{C}{x^2+4}$

(c) $\dfrac{A}{x^3} + \dfrac{B}{x^2} + \dfrac{C}{x} + \dfrac{D}{x-3} + \dfrac{E}{x+2} + \dfrac{F}{x-2}$

(d) $\dfrac{A}{x^3} + \dfrac{B}{x-3} + \dfrac{Cx+D}{x^2+4}$

(e) $\dfrac{A}{x^3} + \dfrac{B}{x^2} + \dfrac{C}{x} + \dfrac{D}{x-3} + \dfrac{E}{x^2+4}$

Name: _____

Instructor: _____

Partial Credit

You must show your work on the partial credit problems to receive credit!

2.(11 pts.) Find the integral

$$\int \frac{3x+1}{x^3+x^2}dx.$$

Name: _____

Instructor: _____

3.(11 pts.) Calculate the integral

$$\int \frac{dx}{x + \sqrt[3]{x}}.$$

Name: _____

Instructor: ANSWERS

Math 10560, Exam 1
February 17, 2015

- The Honor Code is in effect for this examination. All work is to be your own.
- No calculators.
- The exam lasts for 1 hour and 15 min.
- Be sure that your name is on every page in case pages become detached.
- Be sure that you have all 4 pages of the test.

PLEASE MARK YOUR ANSWERS WITH AN X, not a circle!

Please do NOT write in this box.	
Multiple Choice	_____
2.	_____
3.	_____
Total	_____