

MATH 114
12. 17. 2007

Name:

FINAL EXAM

Please circle the name of your TA:

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Show all your work in order to receive credit. A correct answer without any work will receive 0 credit. Partial credit will be given ONLY for work that is correct and relevant to the problem. Please write your answers neatly. Please make sure your cell phones are turned OFF! Good luck!

P1	
P2	
P3	
P4	
P5	
Multiple choice	
TOTAL	

1. A new car purchased in 2001 was valued at \$20,400. In 2007, it was worth \$18,000. Assuming the depreciation is linear, answer the following questions:

i) (4 pts) Find the linear equation that relates the value V of the car (in dollars) to the time t (in years.)

$$V(t) = \underline{\hspace{10em}}$$

ii) (2 pts) What would the value of the car be in 2010?

iii) (4 pts) In what year will the value of the car be \$14,000?

year is

2. Given $f(x) = x^2$ and $g(x) = \sqrt{1-x}$, determine the following:

i) (1 pt) Domain of $g(x)$

ii) (3 pts) Simplify $\frac{f(a+h) - f(a)}{h} =$

iii) (2 pts) $(f \circ g)(x) =$

iv) (1 pt) $(f \circ g)(2) =$

v) (1 pt) Domain of $f \circ g$

vi) (2 pts) $g^{-1}(x) =$

$$g^{-1}(x) = \underline{\hspace{4cm}}$$

3. (10 pts) Find all zeros (rational, real, and imaginary) for

$$P(X) = 2X^4 + X^3 - X^2 - 4X + 2$$

zeros= _____

4. a) (5 pts) If the decibel level (D) at a rock concert is 90, find the intensity (I) of the sound at the concert. Use the formula $D = 10 \log \left(\frac{I}{I_0} \right)$, where $I_0 = 10^{-12}$ watts per square meter.

$$I = \underline{\hspace{2cm}}$$

- b) (5pts) Write in the form $a + bi$ the following complex number:

$$\left(-\frac{1}{2} - \frac{\sqrt{3}}{2}i \right)^9$$

$$a + bi = \underline{\hspace{2cm}}$$

5. (10 pts) A ship sailing due east in the North Atlantic has been warned to change course to avoid a group of icebergs. The captain turns and sails on a compass heading of 60° for a while, then changes course again to a compass heading of 135° until the ship reaches the original course (see the figure). Find the distance travelled by the ship to avoid the icebergs? (Simplify your answers but do NOT rationalize the denominator of your answer).

distance traveled = _____

For each of the following questions circle **only one** answer. If you circle more than one answer you will not get any credit even if the right one was among your choices. There are 10 questions each question is worth 3 points.

6. What is the slope of the line that is perpendicular to the line given by

$$2x + 3y + 9 = 0$$

- A. $\frac{2}{3}$ B. $-\frac{2}{3}$ C. $\frac{3}{2}$ D. $-\frac{3}{2}$ E. none of these
-

7. Solve for x $|2 - 4x| = 12$

- A. $\frac{7}{2}$ B. $-\frac{5}{2}, -\frac{7}{2}$ C. $\frac{5}{2}, -\frac{5}{2}$ D. $-\frac{5}{2}$ E. none of these
-

8. Solve the inequality $2x^3 \leq 4x^4$

- A. $(-\infty, \infty)$ B. $[0, \frac{1}{2}]$ C. $(-\infty, 0] \cup [\frac{1}{2}, \infty)$ D. $[\frac{1}{2}, \infty)$ E. none of these
-

9. Find the horizontal asymptote to the graph of

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

- A. $x = 1$ B. $y = 2$ C. $y = 2x + 3$
D. there are no horizontal asymptotes E. none of these
-

10. Determine the magnitude of $\vec{v} = 5\vec{i} + 6\vec{j}$

- A. 61 B. $\sqrt{61}$ C. 11 D. $\sqrt{11}$ E. none of these
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11. Assume you invest \$100 in an account at an annual interest rate of 3.5% compounded quarterly. What is the amount of money in the account at any time t , t in years.

A. $100 \left(1 + \frac{3.5}{4}\right)^{4t}$ B. $100 \left(1 + \frac{.35}{4}\right)^{4t}$ C. $100 \left(1 + \frac{.035}{4}\right)^{4t}$
D. $100 \left(1 + \frac{.0035}{4}\right)^{4t}$ E. none of these

12. Determine the period of the function $f(x) = -2 \cos\left(\frac{\pi x}{2}\right)$

A. 4 B. 4π C. 2 D. π E. none of these

13. Evaluate $\cos^{-1}\left(-\frac{\sqrt{3}}{2}\right)$

A. $-\frac{\pi}{6}$ B. $\frac{7\pi}{6}$ C. $\frac{\pi}{6}$ D. $\frac{5\pi}{6}$ E. none of these

14. Simplify $\frac{\cot^2 x}{\sec^2 x - 1}$

A. $\cot^4 x$ B. 1 C. -1 D. $-\tan^4 x$ E. none of these

15. Find an equation of the parabola with vertex at $(0, 0)$ and focus $F(0, 1)$

A. $y = 4x^2$ B. $y = \frac{1}{4}x^2$ C. $x = \frac{1}{4}y^2$ D. $x = 4y^2$ E. none of these
