MAC 1147
Fall 2019

Final Exam A

A. Sign and date your scantron on the back at the bottom.

B. In pencil, write and encode in the spaces indicated on your scantron:

1) Name (last name, first initial, middle initial)
2) UF ID Number
3) Section Number — Do not fill this out.

C. Under "special codes" on your scantron, code in the test ID number 5, 1.

1 2 3 4 ● 6 7 8 9 0

● 2 3 4 5 6 7 8 9 0

D. At the top right of your scantron, for "Test Form Code", encode A.

● B C D E

E. 1) There are twenty-one 5-point multiple-choice questions, for a total of 105 points.
2) The time allowed is 120 minutes.
3) You may write on the test.
4) Raise your hand if you need more scratch paper or if you have a problem with your test. DO NOT LEAVE YOUR SEAT UNLESS YOU ARE FINISHED WITH THE TEST.

F. **KEEP YOUR SCANTRON COVERED AT ALL TIMES.**

G. When you are finished:

1) Before turning in your test, check for transcribing errors. Any mistakes you leave in are there to stay.
2) Take your test, scratch paper, and scantron to your TA. Be prepared to show your UF ID card.
3) Answers will be posted in E-Learning after the exam.

H. By taking this exam, you agree to the following **Honor Pledge:**

"I will neither give nor receive any unauthorized aid for this exam."

Questions 1–21 are worth 5 points each.

1. The two expressions below are equivalent if which restrictions are made on x?

$$\frac{x^2-11x+28}{2x^2-11x+15}\cdot\frac{x-3}{x-7} \qquad\qquad \frac{x-4}{2x-5}$$

A. $x \neq 0$

B. $x \neq 3$

C. $x \neq 3, 7$

D. $x \neq \frac{5}{2}$

E. The expressions are equivalent for all x.

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2. The points $(7, 4)$ and $(13, 12)$ are the endpoints of a diameter of a circle. What is the equation of the circle?

A. $(x-7)^2+(y-4)^2=5$

B. $(x-7)^2+(y-4)^2=25$

C. $(x-10)^2+(y-8)^2=5$

D. $(x-10)^2+(y-8)^2=25$

E. $x^2+y^2=1$

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3. What is the y-intercept of the line that passes through the points $(10, 25)$ and $(20, 43)$?
Hint: First find the equation of the line.

A. 9 B. $\frac{5}{7}$ C. $\frac{1}{9}$ D. 8 E. 7

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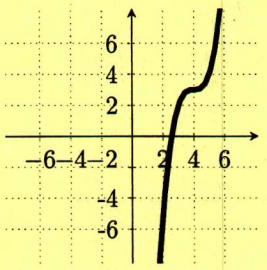
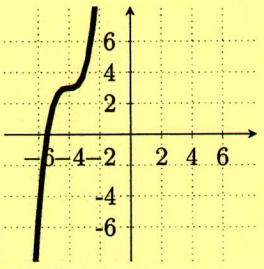
4. Which picture shows the graph of $f(x) = (x-4)^3 + 3$?

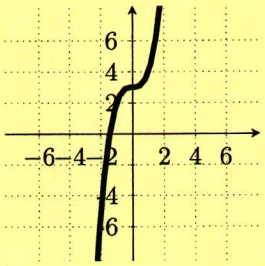
A.



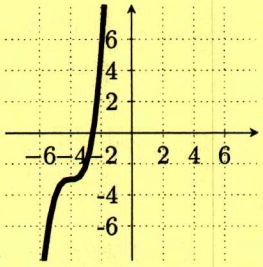
B.



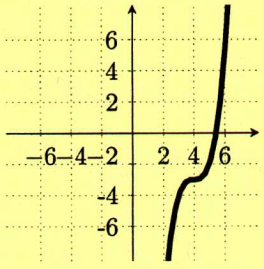
C.



D.



E.



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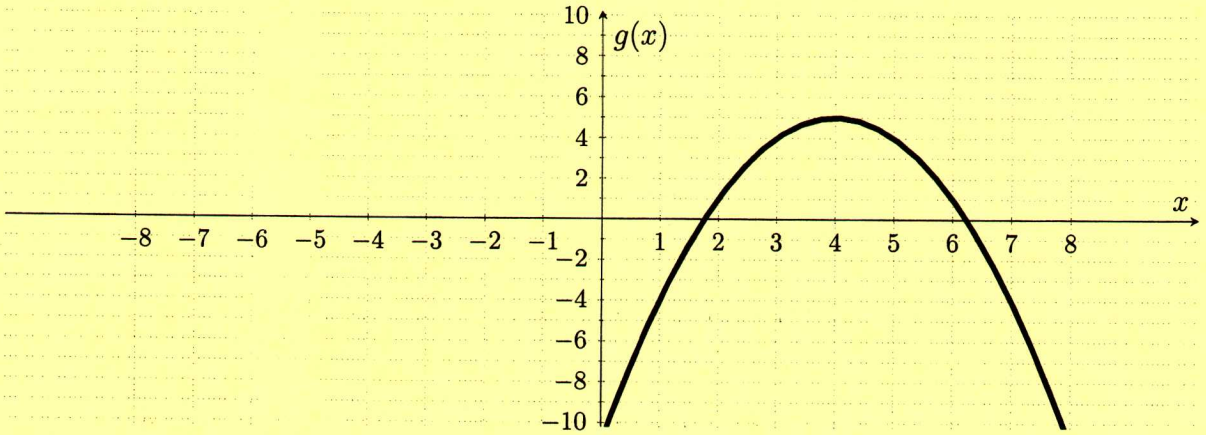
5. Use the table of $f(x)$ and graph of $g(x)$ below to evaluate $(g \circ f)(3)$.

x	4	0	3	2	5
$f(x)$	3	8	5	2	9



A. 3 B. 4 C. 0 D. 5 E. 9

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6. The function $f(x)$ below is one-to-one. What is its inverse?

$$f(x) = \sqrt[5]{4x+7}$$

A. $f^{-1}(x) = \dfrac{1}{\sqrt[5]{4x+7}}$ B. $f^{-1}(x) = \left(\dfrac{1}{4}x - 7\right)^5$ C. $f^{-1}(x) = \dfrac{x^5 - 7}{4}$

D. $f^{-1}(x) = \sqrt[5]{4x+7}$ E. $f^{-1}(x) = \left(\dfrac{x}{4}\right)^5 - 7$

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7. For which value of c does the function $f(x) = -9x^2 + 12x + c$ have two x-intercepts?
Hint: Use the discriminant.

A. -3

B. -4

C. -6

D. -8

E. There are no values of c for which $f(x)$ has two x-intercepts.

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8. Suppose that $f(x)$ is a polynomial with zeros at $x = 3$ and $x = 4i$. Which polynomial is a factor of $f(x)$?

A. $x^2 + 7x + 12$

B. $x + 3$

C. $x^2 - 16$

D. $x^3 - 3x^2 + 16x - 48$

E. $x - 4$

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9. Which statements correctly describe the behavior of the function below?

$$g(x) = \frac{-7x^5 + 11x^2 + 9}{3x^8 + 2x^3 + 10}$$

Hint: Find the horizontal asymptote.

A. As $x \to \infty, g(x) \to \infty$. As $x \to -\infty, g(x) \to \infty$.

B. As $x \to \infty, g(x) \to -\infty$. As $x \to -\infty, g(x) \to -\infty$.

C. As $x \to \infty, g(x) \to 0$. As $x \to -\infty, g(x) \to 0$.

D. As $x \to \infty, g(x) \to \frac{-7}{3}$. As $x \to -\infty, g(x) \to \frac{-7}{3}$.

E. As $x \to \infty, g(x) \to -\infty$. As $x \to -\infty, g(x) \to \infty$.

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10. Find the solution to the inequality.

$$\frac{x^2 - 9x + 14}{x^2 - 13x + 36} > 0$$

A. $(-\infty, \infty)$

B. $(2, 4) \cup (7, 9)$

C. $(-\infty, 2) \cup (7, 9)$

D. $(4, 7)$

E. $(-\infty, 2) \cup (4, 7) \cup (9, \infty)$

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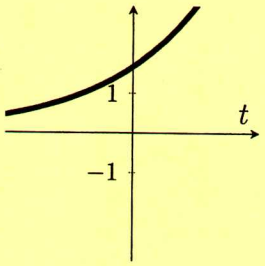
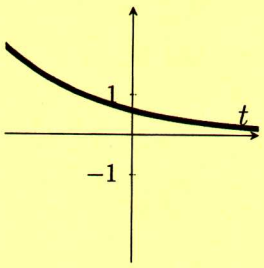
11. Given the function $f(t) = Pe^{rt}$ with $r > 0$, and $P > 1$, which graph below could be the graph of $f(t)$?

A.



B.



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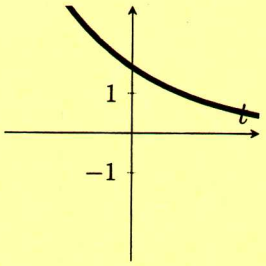
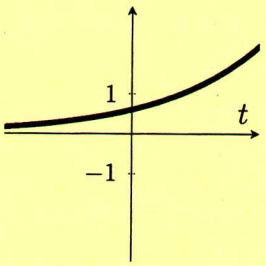


D.



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12. Given that $x > 0$, simplify the expresison using the properties of logarithms and exponents.

$$\ln\left(9\sqrt[3]{x^4}\right) - \ln\left(7\sqrt[5]{x^3}\right)$$

A. $\ln\left(\frac{9}{7}\sqrt[15]{x^{11}}\right)$ B. $\ln\left(2\sqrt{x}\right)$ C. $\ln\left(2\sqrt[5]{x^4}\right)$

D. $\ln\left(16\sqrt[5]{x^3}\right)$ E. $\ln\left(\frac{9}{7}\sqrt[15]{x^{29}}\right)$

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13. A population's growth is modeled using the function $f(t) = ae^{bt}$. The population grows from 150 to 450 over the course of 8 years. What is the value of b?

A. $\frac{\ln(2)}{8}$ B. $\frac{\ln(8)}{2}$ C. $\frac{\ln(3)}{8}$ D. $\frac{\ln(8)}{3}$ E. $\frac{\ln(3)}{\ln(2)}$

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14. Which angle's terminal side lies in Quadrant II when in standard position?

A. $\theta = 0$ radians B. $\theta = 1$ radian C. $\theta = 3$ radians

D. $\theta = 5$ radians E. $\theta = 7$ radians

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15. Choose the value that is different from the others.

A. $\sin\left(\frac{5\pi}{4}\right)$ B. $\sin\left(\frac{3\pi}{4}\right)$ C. $\sin\left(\frac{\pi}{4}\right)$ D. $\sin\left(\frac{11\pi}{4}\right)$ E. $\cos\left(\frac{-\pi}{4}\right)$

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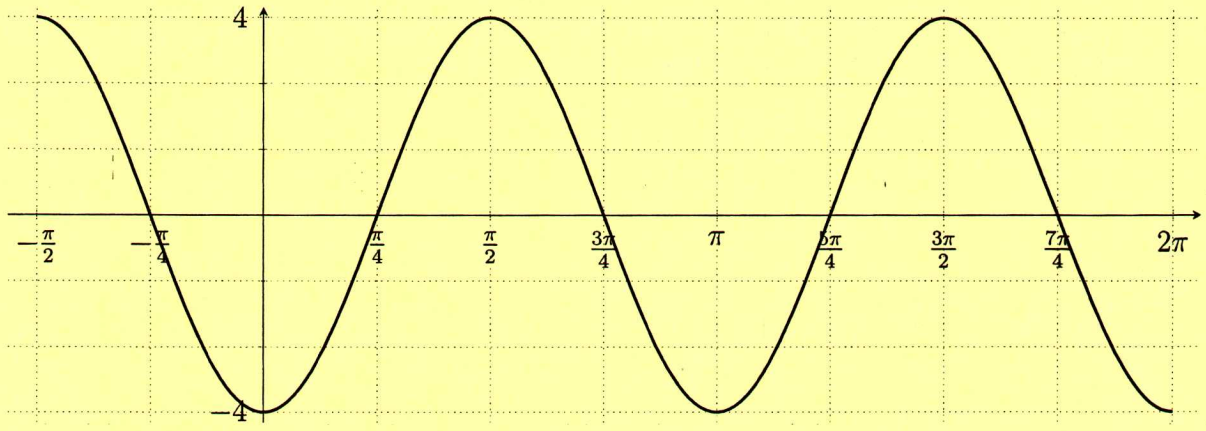
16. Identify the function $f(x)$ graphed below.



A. $f(x) = 4\cos\left(2x - \frac{\pi}{2}\right)$ B. $f(x) = 4\sin\left(2x - \frac{\pi}{2}\right)$ C. $f(x) = 4\cos\left(x - \frac{\pi}{4}\right)$

D. $f(x) = 4\sin\left(x - \frac{\pi}{4}\right)$ E. $f(x) = 4\sin(2x)$

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17. Rewrite the trigonometric expression below in algebraic form.

$$\cos\left(\arctan\frac{k}{5}\right)$$

A. $\dfrac{\sqrt{25-k^2}}{5}$ B. $\dfrac{k}{\sqrt{k^2+25}}$ C. $\dfrac{\sqrt{25-k^2}}{k}$ D. $\dfrac{k}{5}$ E. $\dfrac{5}{\sqrt{k^2+25}}$

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18. Given $a > 0$ and $a \neq 1$, $y = \log_a x$ if and only if...

A. $x^y = a$ B. $y^x = a$ C. $a^x = y$ D. $a^y = x$ E. $x^a = y$

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19. Find the solutions to the equation $6\cos^2(x) + 5 = 8$ on the interval $[0, 2\pi)$. What is the sum of the solutions?

A. 0 B. π C. 2π D. 3π E. 4π

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20. Evaluate: $\cos(15°)$

A. $\frac{\sqrt{6}-\sqrt{2}}{4}$ B. $\frac{\sqrt{6}+\sqrt{2}}{4}$ C. $\frac{\sqrt{2}-\sqrt{6}}{4}$ D. $\frac{\sqrt{6}-\sqrt{3}}{4}$ E. $\frac{\sqrt{6}+\sqrt{3}}{4}$

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21. Which of these expresses $\sin(160°)$ in terms of $\sin(80°)$ and $\cos(80°)$?

A. $\pm\sqrt{\frac{1+\cos(80°)}{2}}$ B. $2\sin(80°)\cos(80°)$ C. $\frac{\sin((80°))}{1+\cos(80°)}$

D. $\cos^2(80°)-\sin^2(80°)$ E. $\frac{1-\cos(80°)}{\sin(80°)}$
