Precalculus Exam **Name:**_____

Fall 2005 (Practice version) Section Instructor:_____

- *You may not use a calculator on this exam.*
- *Please clearly circle the letter that corresponds to your answer to each question.*
- *Note that* $\log x = \log_{10} x$ *and* $\exp(x) = e^x$.

1. The expression $5x^2 + 7x - 6$ can be factored as
   (a) $(5x + 6)(x - 1)$
   (b) $(5x - 6)(x + 1)$
   (c) $(5x - 3)(x + 2)$
   (d) $(5x + 3)(x - 2)$
   (e) Cannot be factored.

2. The values of x that satisfy $\dfrac{2}{(x+1)^2} < 18$ are
   (a) $-\dfrac{1}{3} < x < \dfrac{1}{3}$
   (b) $-\dfrac{4}{3} < x < -\dfrac{2}{3}$
   (c) $x > -\dfrac{2}{3}$ or $x < -\dfrac{4}{3}$
   (d) $x > -\dfrac{2}{3}$
   (e) None of the above.

3. The expression $\sqrt[5]{x^{-7}}$ can be simplified to
   (a) $x^{\frac{7}{5}}$
   (b) $x^{-\frac{7}{5}}$
   (c) $5x^7$
   (d) $x^{\frac{5}{7}}$
   (e) $x^{-\frac{7}{5}}$

4. The expression $\dfrac{5x}{x+1} + \dfrac{6}{-x+2}$ can be simplified to

   (a) $\dfrac{5x^2+16x+6}{(x+1)(-x+2)}$

   (b) $\dfrac{5x+6}{(x+1)(-x+2)}$

   (c) $\dfrac{5x^2-16x-6}{(x+1)(x-2)}$

   (d) $\dfrac{5x+6}{3}$

   (e) $\dfrac{11}{x+2}$

5. The expression $\dfrac{2x}{x+3} \cdot \dfrac{3}{x-1}$ can be simplified to

   (a) $\dfrac{6x}{x^2-2x-3}$

   (b) $\dfrac{2x+3}{x^2-2x-3}$

   (c) $\dfrac{2x+3}{x^2+2x-3}$

   (d) $\dfrac{6x}{x^2-3}$

   (e) $\dfrac{6x}{x^2++2x-3}$

6. The expression $a^3(a-5)(a+6)$ can be expanded as

   (a) $a^5 - a^4 - 30a^3$

   (b) $a^5 + a - 30$

   (c) $a^5 + a^4 - 30a^3$

   (d) $a^5 - a^4 - 11a^3$

   (e) $a^5 - a - 30$

7. The solutions to the equation $|x| - 16 = 0$ are

   (a) $x = 4$ only.

   (b) $x = 16$ only.

   (c) $x = 4$ and $x = -4$ only.

   (d) $x = 16$ and $x = -16$ only.

   (e) There are no real values of x that solve this equation.

8. Find the expression that is equivalent to 7^{9x+2}.

(a) $e^{(9x+2)\ln 7}$
(b) $e^{9x\ln 7}+2$
(c) $e^{7\ln(9x+2)}$
(d) $e^{11x\ln 7}$
(e) $e^{7\ln 11x}$

9. Find the expression that is equivalent to

$$\frac{x^{1-a}y^{a^2-1}}{(x^{-1}y^a)^a}.$$

(a) $-y^{a^2-2a-1}$
(b) $\dfrac{y}{x}$
(c) $\dfrac{y^a}{x}$
(d) $(xy)^{2a^2-a}$
(e) None of the above.

10. Suppose that

$$f(x)=x^2+x+7$$

What is $f(2x)$?

(a) $2x^2+2x+7$
(b) $2x^2+x+7$
(c) $2x^2+2x+14$
(d) $4x^2+2x+7$
(e) None of the above.

11. Suppose we have the following functions:

$$f(x)=\sqrt{x^2+1}$$
$$g(x)=x+3$$

What is $f(g(-2))$?

(a) $\sqrt{2}$
(b) $\sqrt{5}+3$
(c) $\sqrt{26}$
(d) 2
(e) None of the above.

12. Find the expression that is equivalent to

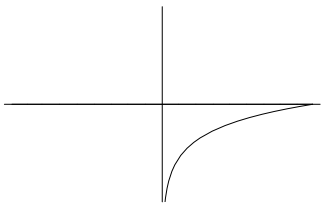
$$\log_{11}7.$$

(a) $\dfrac{\ln 7}{\ln 11}$
(b) $(\ln 11)(\ln 7)$
(c) $(\ln 7)(\ln 11)$
(d) $(\log 7)(\log 11)$
(e) $\dfrac{\ln 11}{\ln 7}$

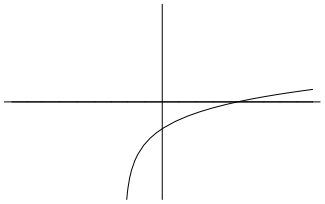
13. Choose the graph that best fits the function

$$f(x) = \ln\left(\frac{4x+11}{7}\right).$$

(a)



(b)



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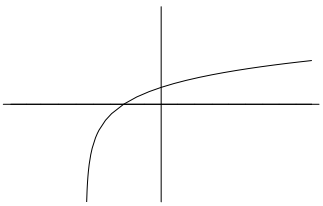

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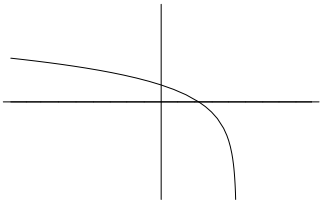


14. Find the value of x that solves the equation

$$17 \cdot 2^x = 3 \cdot 10^x.$$

(a) $x = \dfrac{\ln 3 - \ln 17}{\ln 5}$

(b) $x = \dfrac{\ln 17 - \ln 3}{\ln 5}$

(c) $x = \dfrac{17}{15}$

(d) $x = \dfrac{\ln 17 - \ln 3}{\ln 2 - \ln 10}$

(e) No solution.

15. Find the value of x that solves the equation

$$\ln(x^3 + x^2) = \ln 6x$$

(a) $x = e^2$

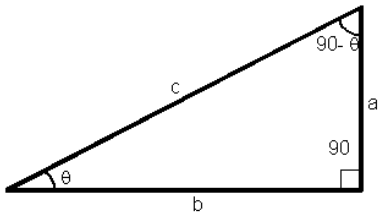
(b) $x = e^{-3}$

(c) $x = 2$

(d) $x = -3$

(e) No solution.

16. The value of θ is:



(a) $\sin^{-1}\left(\frac{b}{c}\right)$

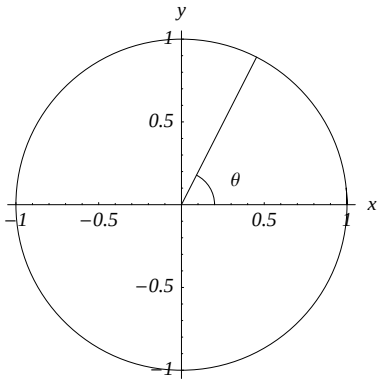
(b) $\cos^{-1}\left(\frac{c}{b}\right)$

(c) $\tan^{-1}\left(\frac{a}{b}\right)$

(d) $\sec^{-1}\left(\frac{a}{c}\right)$

(e) None of the above.

17. The numerical value of $\sin\theta$ is approximately equal to:



(a) -0.45

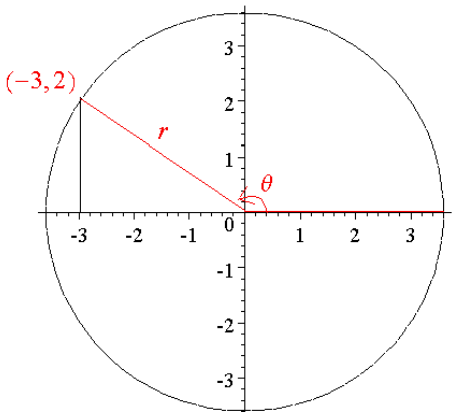
(b) -0.89

(c) 0.45

(d) 0.89

(e) None of the above.

18. The numerical value of θ is approximately equal to:

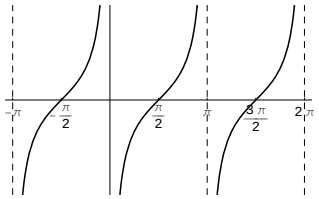


(a) $\arctan(\frac{-3}{2})$
(b) $\arctan(\frac{2}{-3})$
(c) $\arccos(\frac{-3}{\sqrt{13}})$
(d) $\arcsin(\frac{2}{\sqrt{13}})$
(e) None of the above.

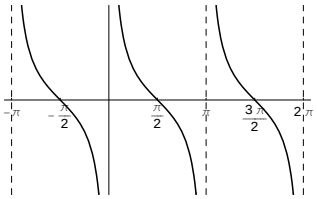
19. Choose the graph that best fits the function

$$f(x) = -\tan\left(x - \frac{\pi}{2}\right).$$

(a)



(c)



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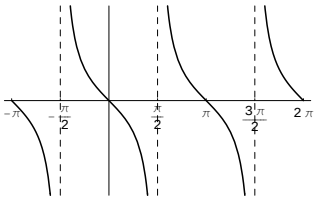
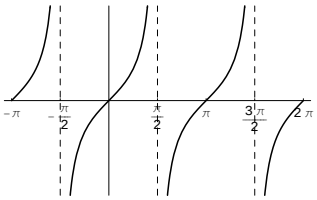


(d)



20. The value of $\tan(7\pi/6)$ is equal to:

(a) $\sqrt{3}/3$
(b) $-\sqrt{3}/3$
(c) $\sqrt{3}$
(d) $-\sqrt{3}$
(e) None of the above.