M161, Alg-Trig Exam, Fall 2005

NAME:_____

SECTION:_____

INSTRUCTOR:_____

HIGH SCHOOL:_____

You may not use calculators. The test will be graded right answer only.

Where I satisfied my Alg-Trig Prereq.
Place a check in the appropriate box. You may mark more than one.

Alg-Trig	Check or no check
Courses at CSU (IMP)	
Math Placement Exam	
Two semesters of HS Calculus	
Transfer credit taken While a HS student	
Transfer credit taken While College student	

1. Expand and simplify. $(2x+3)^2 =$ $(2x)^2 + 2(2x)\cdot 3 + 3^2 = \boxed{4x^2+12x+9}$

For problems 2-6, simplify the following expressions, if possible (combine like terms, no negative exponents, evaluate numerical coefficients, etc).

2. $\dfrac{(2x^2y^{-3})^2}{(3xy)^3} = \dfrac{2^2 x^4 y^{-6}}{3^3 x^3 y^3} = \boxed{\dfrac{4}{27}\ \dfrac{x}{y^9}}$

3. $\dfrac{\frac{e^{n+1}}{(n+1)!}}{\frac{e^n}{n!}} = \dfrac{e^{n+1}}{(n+1)\,n!}\,\dfrac{n!}{e^n} = \boxed{\dfrac{e}{n+1}}$

4. $\sqrt{x^2+4}$ — cannot be simplified further

5. $\dfrac{\frac{(n+1)x^{n+1}}{2^{n+1}}}{\frac{nx^n}{2^n}} = \dfrac{(n+1)\,x^{n+1}}{2^{n+1}}\,\dfrac{2^n}{n\,x^n} = \boxed{\dfrac{n+1}{n}\,\dfrac{x}{2}}$

6. $\dfrac{(x^2)^2 y^{4/3}\sqrt{z}}{x(y^3)^2 z^2} = \dfrac{x^4 y^{4/3} z^{1/2}}{x y^6 z^2} = \boxed{\dfrac{x^3}{y^{14/3} z^{3/2}}}$

7. $\log_2 32 = \log_2 2^5 = 5\log_2 2 = \boxed{5}$

8. Solve $x^2+5x+6=0$. $= (x+3)(x+2)$

$\boxed{x=-2 \quad x=-3}$

9. Solve for x, i.e. find the values of x described by the following expression: $|x-1|<3/2$

$\Rightarrow -\frac{3}{2} < x-1 < \frac{3}{2} \Rightarrow \boxed{-\frac{1}{2} < x < \frac{5}{2}}$ or $\boxed{x \in \left(-\frac{1}{2}, \frac{5}{2}\right)}$

10. If $|2x+1|=3$, then $x=$

$$|2x+1| = \begin{cases} 2x+1 & 2x+1 \geq 0 \text{ or } x \geq -\frac{1}{2} \\ -(2x+1) & 2x+1 < 0 \text{ or } x < -\frac{1}{2} \end{cases}$$

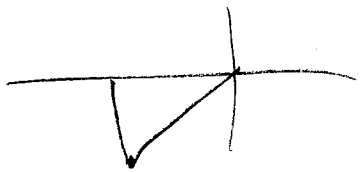
$x \geq -\frac{1}{2}$: $|2x+1| = 2x+1 = 3 \Rightarrow \boxed{x=1}$

$x < -\frac{1}{2}$: $|2x+1| = -(2x+1) = 3$ or $-2x-1=3$ or $2x=-4$, $\boxed{x=-2}$

11. $\sin\frac{3\pi}{2} =$ -1

12. $\cos\frac{2\pi}{2} =$ $\cos\pi$ $= -1$

13. $\cos\frac{5\pi}{4} =$ $-\frac{\sqrt{2}}{2}$



14. Given that $\sin\theta = 1/2$, find $\cos\theta$. $= \pm\sqrt{1-\sin^2\theta} = \pm\sqrt{1-\frac{1}{4}} = \pm\frac{\sqrt{3}}{2}$.

(Note: there are many ways to work this problem.)

15. Solve for x, $0 \le x < 2\pi$: $\cos(2x) = \frac{1}{2}$. $\Rightarrow$ $2x = \frac{\pi}{3}, \frac{5\pi}{3}, \frac{7\pi}{3}, \frac{11\pi}{3}, \frac{13\pi}{3}, \ldots$

$x = \frac{\pi}{6}, \frac{5\pi}{6}, \frac{7\pi}{6}, \frac{11\pi}{6}$ ~~$\frac{13\pi}{6}$~~

16. If $\tan\theta = -\sqrt{3}$ and $\sin\theta = \sqrt{3}/2$, then $\cos\theta =$

$\Rightarrow \frac{\sin\theta}{\cos\theta}$ i.e. $\frac{\sqrt{3}/2}{\cos\theta} = -\sqrt{3}$, $\cos\theta = -\frac{1}{2}$.

17. If $x = 2\sin\theta$, then $\frac{1}{\sqrt{4-x^2}} = \frac{1}{\sqrt{4-4\sin^2\theta}} = \frac{1}{2}\frac{1}{\sqrt{1-\sin^2\theta}} = \frac{1}{2}\frac{1}{\cos\theta}$

18. If $x = 3\tan\theta$, then $(9+x^2)^{3/2} =$ $(9+9\tan^2\theta)^{3/2} = 27(1+\tan^2\theta)^{3/2}$

$= 27(\sec^2\theta)^{3/2}$

$= 27\sec^3\theta$.

19. $\cos 0 =$ 1

20. If $y = \log_{10}(2x)$, solve for $x =$.

$2x = 10^y$, $x = \frac{1}{2}10^y$