

**MATH 221: Calculus and Analytic Geometry**  
**Prof. Ram, Fall 2004**

**HOMEWORK 5: SELECTED ANSWERS**

**Problem A. Evaluating limits when  $x \rightarrow 0$ .**

- |                      |                               |                       |                  |
|----------------------|-------------------------------|-----------------------|------------------|
| (1) 10               | (2) 5                         | (3) $17/2$            | (4) $-317/422$   |
| (5) $-3/5$           | (6) $\frac{1}{2\sqrt{x}}$     | (7) $1/2$             | (8) $\sqrt{2}/4$ |
| (9) $-(1/2)x^{-3/2}$ | (10) $2\sqrt{a}$              | (11) $1/2$            | (12) 2           |
| (13) 1               | (14) $\frac{a}{2\sqrt{ax+b}}$ | (15) $mn(mx+c)^{n-1}$ |                  |

**Problem B. Evaluating limits when  $x \rightarrow a$ .**

- |            |                            |                     |                            |
|------------|----------------------------|---------------------|----------------------------|
| (1) 5      | (2) 14                     | (3) $-2$            | (4) $-11$                  |
| (5) 3      | (6) $1/2$                  | (7) 4               | (8) 108                    |
| (9) 3125   | (10) $12a^{11}$            | (11) $(5/2)a^{3/2}$ | (12) $(5/3)(a+2)^{2/3}$    |
| (13) 6     | (14) $20/3$                | (15) $n$            | (16) $\frac{1}{2\sqrt{a}}$ |
| (17) $1/2$ | (18) $\frac{2\sqrt{3}}{9}$ | (19) $na^{n-1}$     |                            |

**Problem C. Evaluating limits as  $x \rightarrow \infty$ .**

- |           |            |           |           |        |
|-----------|------------|-----------|-----------|--------|
| (1) 1     | (2) $3/5$  | (3) $1/3$ | (4) $2/7$ | (5) 12 |
| (6) $1/2$ | (7) $1/2$  | (8) 0     | (9) $e$   | (10) 0 |
| (11) 0    | (12) $1/2$ |           |           |        |

**Problem D. Limits with exponential and log functions.**

- |                     |             |       |         |
|---------------------|-------------|-------|---------|
| (1) 1               | (2) $\ln a$ | (3) 1 | (4) $e$ |
| (5) $\ln a - \ln b$ | (6) 1       | (7) 0 |         |

(11)  $\frac{1}{2\sqrt{x}} e^{\sqrt{x}}$       (12)  $\frac{a}{ax+b}$       (13)  $x^x(\ln x + 1)$

**Problem E. Limits with trigonometric functions.**

- (1)  $3/4$       (2)  $1/3$       (3)  $1$       (4)  $1/2$       (5)  $a/b$   
(6)  $1/4$       (7)  $m/n$       (8)  $0$       (9)  $2/3$       (10)  $1$   
(11)  $1/2$       (12)  $\cos a$       (13)  $2$       (14)  $1/3$       (15)  $-2$   
(16)  $-2$       (17)  $1/6$       (18)  $2$       (20)  $\cos a$       (21)  $0$

**Problem G. Limits with inverse trigonometric functions.**

- (1)  $1/2$       (2)  $-\sqrt{2}/2$       (3)  $1/2$       (4)  $0$   
(5)  $2/3$