Name:

Ps ID:

Math 1432
Quiz 6 Version A

1. (3pts) Use trigonometric substitution to evaluate:

$$\int \frac{x^2}{\sqrt{25-x^2}}\,dx$$

See version B

2. (2 pts) Integrate: $\displaystyle\int \frac{x^3+16x+1}{x^2+16}\,dx$

See version B

3. a) (1pt) Find the partial fraction decomposition. <u>DO</u> find the values of "A, B, etc".

$$\frac{21}{x^2-5x-6} = \frac{21}{x^2-6x+x-6} = \frac{21}{(x-6)(x+1)} = \frac{A}{x-6} + \frac{B}{x+1}$$

$$21 = A(x+1) + B(x-6)$$

b) (2pts) $\displaystyle\int \frac{21}{x^2-5x-6}\,dx =$

$x=6 \quad 21 = 7A \Rightarrow A = 3$

$x=-1 \quad 21 = -7B \Rightarrow B = -3$

$$= \int\left(\frac{3}{x-6} + \frac{-3}{x+1}\right)dx = 3\ln|x-6| - 3\ln|x+1| + C$$

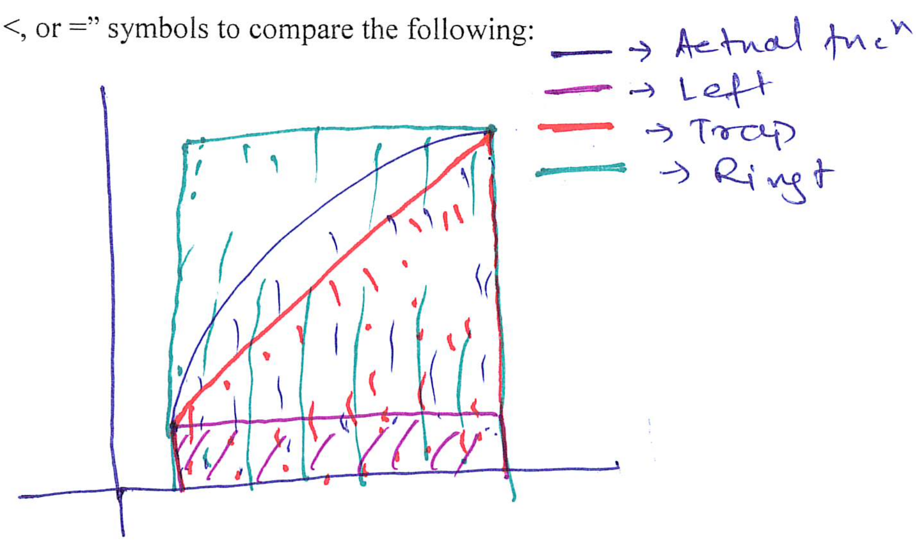
4.(2pts) Let $f(x)$ be a positive function that is increasing and concave down. Suppose $L_{10}, R_{10}, M_{10}, T_{10}$ are computed to approximate $\int_0^1 f(x)dx$. Use ">, <, or =" symbols to compare the following:

$L_{10} < T_{10} < R_{10}$

$L_{10} < \int_a^b f(x)dx < R_{10}$

$L_{10} < M_{10} < R_{10}$

$T_{10} < \int_a^b f(x)dx$



Name:

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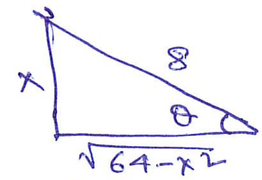
$\sin^2\theta = \frac{1}{2}(1-\cos 2\theta)$

$\sin 2\theta = 2\sin\theta\cos\theta$

Math 1432
Quiz 6 Version B

1. (3pts) Use trigonometric substitution to evaluate:



$\int \frac{x^2}{\sqrt{64-x^2}}\,dx$ $\quad x = 8\sin\theta \quad dx = 8\cos\theta\,d\theta$

$$= \int \frac{64\sin^2\theta \; 8\cos\theta\,d\theta}{\sqrt{64-64\sin^2\theta}} = \int \frac{64\sin^2\theta\; \cancel{8}\cos\theta\,d\theta}{\cancel{8}\cos\theta} = 64\int \frac{1}{2}(1-\cos 2\theta)\,d\theta$$

$$= 32\left[\theta - \frac{\sin 2\theta}{2}\right] + C = 32\theta - 32\sin\theta\cos\theta + C$$

$$= 32\sin^{-1}\frac{x}{8} - 32\,\frac{x}{8}\,\frac{\sqrt{64-x^2}}{8} + C$$

$$= 32\sin^{-1}\frac{x}{8} - \frac{x\sqrt{64-x^2}}{2} + C$$

2. (2 pts) Integrate: $\int \frac{x^3+25x+1}{x^2+25}\,dx$

$$= \int\left(\frac{x^3+25x}{x^2+25} + \frac{1}{x^2+25}\right)dx = \int\left(x + \frac{1}{x^2+25}\right)dx$$

$$= \frac{x^2}{2} - \frac{1}{5}\tan^{-1}\frac{x}{5} + C$$

3. a) (1pt) Find the partial fraction decomposition. DO find the values of "A, B, etc".

$$\frac{10}{x^2+x-6} = \frac{10}{x^2+3x-2x-6} = \frac{10}{(x+3)(x-2)} = \frac{A}{x+3} + \frac{B}{x-2}$$

$$10 = A(x-2) + B(x+3)$$

$x = 2 \quad 10 = 5B \quad B = 2$

$x = -3 \quad 10 = -5A \quad A = -2$

b) (2pts) $\int \frac{10}{x^2+x-6}\,dx =$

$$= \int\left(\frac{-2}{x+3} + \frac{2}{x-2}\right)dx = -2\ln|x+3| + 2\ln|x-2| + C$$

4.(2pts) Let $f(x)$ be a positive function that is decreasing and concave up. Suppose $L_{10}, R_{10}, M_{10}, T_{10}$ are computed to approximate $\int_0^1 f(x)dx$. Use ">, <, or =" symbols to compare the following:

$L_{10} > T_{10} > R_{10}$

$L_{10} > \int_a^b f(x)dx > R_{10}$

$L_{10} > M_{10} > R_{10}$

$T_{10} > \int_a^b f(x)dx$