

(6pts) **Problem 1**

A rectangular storage container with an open top is to have a volume of  $10 \text{ m}^3$ . The length of its base is twice the width. Material for the base cost \$12 per square meter. Material for the side cost \$5 per square meter. Find the cost of materials for the cheapest such container.

(6pts) **Problem 2**

Evaluate the integral

$$\int_{-3}^0 \left(1 + \sqrt{9 - x^2}\right) dx$$

(5pts) **Problem 3**

If  $g(x) = \int_{\cos x}^{\sin x} \ln(2 + 3t) dt$ , then  $g'(0) =$

(5pts) **Problem 4**

$$\lim_{n \rightarrow \infty} \left[ \sum_{i=1}^n \left( \frac{1}{n} \right) \frac{1}{\sqrt{1 - \left( \frac{i}{2n} \right)^2}} \right] =$$

(a)  $\int_0^{\frac{1}{2}} \frac{2}{\sqrt{1-x^2}} dx$

(b)  $\int_0^{\frac{1}{2}} \frac{1}{1-x^2} dx$

(c)  $\int_{-\frac{1}{2}}^0 \frac{1}{\sqrt{1-x^2}} dx$

(d)  $\int_{-\frac{1}{\sqrt{2}}}^{\frac{1}{2}} \frac{2}{\sqrt{1-2x^2}} dx$

(e)  $\int_{-2}^2 \frac{2}{\sqrt{x}} dx$

(6pts) **Problem 5**

A partical is moving in a straight line with velocity  $v(t) = 2 \sin 2t$  ( $m/sec$ ). Find the total distance covered in meters by the partical in the time interval  $0 \leq t \leq \frac{3\pi}{4}$ .

(6pts)**Problem 6**

Evaluate the integral

$$\int \tan^3 x \sqrt[3]{\sec x} dx$$

(6pts)**Problem 7**

Express the following numbers in the form  $a + ib$ .

(a)  $z_1 = i^4 - 3i^3 + 4i^2 + 2i - 6$

(b)  $z_2 = \left( \frac{2i}{1+i} \right)^4$ .